APPENDIX M

Harborpark Interim Planning Overlay District
TRANSPORTATION ANALYSIS
FOR THE NORTH END /
DOWNTOWN WATERFRONT SUBDISTRICT

DRAFT REPORT

Prepared for
The Boston Redevelopment Authority

By
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FINAL DRAFT

HARBORPARK INTERIM PLANNING OVERLAY DISTRICT

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1.0 INTRODUCTION

During the initial phase of the Harborpark IPOD Transportation Study, TAMS Consultants Inc. undertook a review and assessment of general transportation conditions in the entire District, including the Charlestown Waterfront, the North End/Downtown Waterfront, the South Boston Piers and Dorchester Bay. The North End/Downtown Waterfront Subdistrict was identified as an area in which land use changes might be expected to take place as a result of proposed changes in zoning. That District was therefore selected for more detailed analysis of transportation impacts in this subsequent study.

The purpose of the study is to assess the transportation impacts, both negative and positive, which are likely to result from land use development expected to occur under the proposed zoning now being considered by the Boston Redevelopment Authority (BRA). In order to evaluate such impacts, it is also necessary to assess the impacts which would result from land use development under the existing zoning, that is for "no action" conditions.

The analysis was therefore carried out for three scenarios - Existing conditions (Scenario I) and two future year conditions (Scenario II for Year 2000 under existing zoning, and Scenario III for Year 2000 under proposed zoning). The year 2000 was selected as an appropriate year for analysis for which the proposed major roadway projects (i.e., the Central Artery/Tunnel) are expected to be complete. These projects will have significant impact on downtown traffic conditions, and will include a number of important changes to the roadway network in the vicinity of the Downtown Waterfront.

The Boston Transportation Department (BTD) is currently undertaking a design study of improvements to Commercial Street for the year 1995, under an Urban Systems Contract. Discussions were held with their consultant as part of this study in order to take into account the proposals which are being formulated for consideration by the BTD. Once these proposals have been reviewed and assessed by the BTD, and the design has progressed to a 25% completion level, they will be subject to a public hearing, which is expected to take place early next year. It is therefore important to consider the likely improvement proposals resulting from the BTD study in the analysis for this study. Accordingly, the improvements which are currently being developed by the BTD are included in the traffic analysis.

In addition to analysis of traffic conditions, the study also addresses parking, pedestrian, transit and water transportation issues. Although these aspects do not generally lend themselves to such detailed quantitative analysis as traffic, they do raise important issues for the Downtown Waterfront, and it is important to consider their impacts under future land use zoning, either existing or proposed. The analysis also addresses mitigation measures to deal with adverse impacts and issues arising as a result of the proposed zoning changes, as well as general transportation improvements which might be desirable in any event under either zoning condition.

This report, which summarizes the methodology and results of the analysis, is divided into six main sections, dealing with the following elements of the study:

- Land Use
- Traffic Analysis
- Parking
- Transit / Water Transportation
- Pedestrian / Other Issues
- Conclusion / Improvement Strategies

The North End/Downtown Waterfront Subdistrict is illustrated in Figures 1 and 2, which also identifies the key locations which were subject to detailed traffic analysis. Figure 1 covers the Commercial Street section of the District from the Charlestown Bridge to the Pilot House, and Figure 2 covers the Atlantic Avenue section from Lewis Wharf to the Northern Avenue Bridge.

Figure 1 : Waterfront District – Commercial Street Section

NOTE : Intersections #1 – #16 denote key locations subject
to Level of Service analysis as referenced in Section 3.

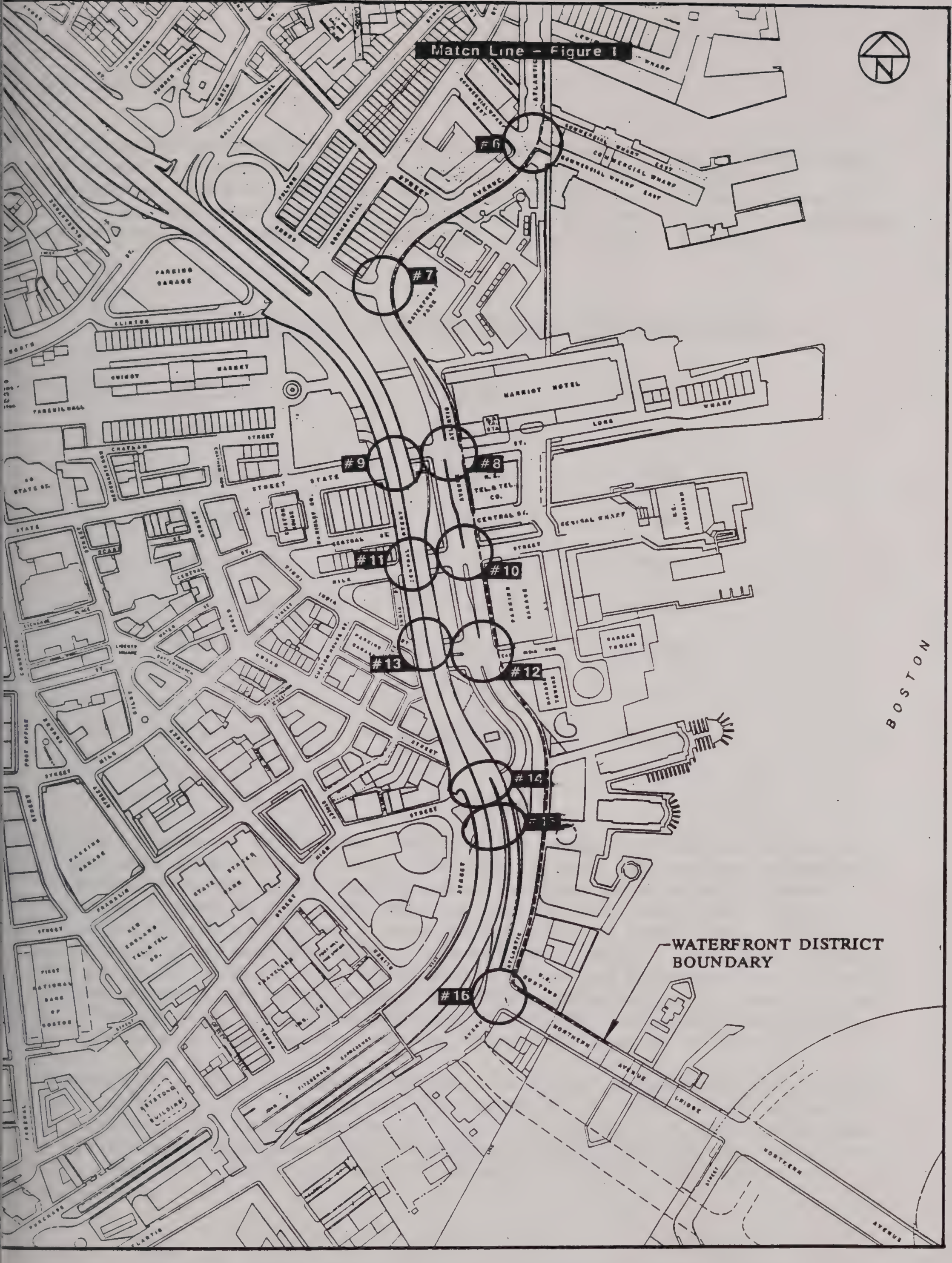

Figure 2 : Waterfront District – Atlantic Avenue Section

NOTE : Intersections #1 – #16 denote key locations subject to Level of Service analysis as referenced in Section 3.

2.0 LAND USE

The North End/Downtown Waterfront Subdistrict covers an area of approximately 103 acres. Although there is a significant proportion of commercial development, the District contains a myriad of other uses including public buildings, recreation space, residential units, parkland, tourist attractions and hotels. The breakdown of land uses is shown in Table 1 below.

TABLE 1 : EXISTING WATERFRONT DISTRICT LAND USE BY AREA

Land Use	Area	% Total
Industrial	3 acres	3.0%
Commercial	36 acres	34.6%
Residential	20 acres	19.6%
Open Space	21 acres	20.6%
Public Buildings	19 acres	18.7%
Vacant	4 acres	3.5%
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Total	103 acres	100.0%

(Source : BRA)

For the purposes of this study, the BRA staff prepared a detailed break-down of land uses on a parcel-by-parcel basis for each of the analysis scenarios. The projections for the future year scenarios under existing and proposed zoning were based on the likely build-out which could take place under the relevant land use zoning, and, where appropriate, the projections reflected the details of current proposals or planned development. Individual projects will of course be subject to review by the BRA as and when they are proposed, and the proposed new zoning extends the requirements for review under Article 31. The resulting total square footage of all land uses under each scenario for each area or wharf on the Downtown Waterfront is shown in Table 2.

It should be noted that the open space areas of the District north of the US Coast Guard facility as far as the Charlestown Bridge, that is the areas containing the playground, softball field and skating rink, are not included in the land-use summaries, since no changes in open space are desired by the City. Similarly, the Waterfront Park is not included in the land use projections.

TABLE 2 : SUMMARY OF LAND USE PROJECTIONS

(Total Square Footage - All land uses, excluding Transportation/Parking/Recreational Open Space)

	Existing	Additional Scenario II	Additional Scenario III
Appraiser's Stores	153,000	0	0
400 Atlantic Avenue	81,000	0	0
Rowes/Fosters Wharf	665,000	0	0
India Wharf	791,250	178,000	0
Central Wharf	108,000	796,000	742,000
New England Telephone	210,000	0	0
Marriott Long Wharf	370,000	0	0
Chart House/Custom House	75,000	0	0
Long Wharf	0	0	0
Commercial Wharf/Granite Bld	196,000	0	0
Commercial Wharf/Wood Bldgs.	32,000	0	0
Commercial Wharf/Finger Pier	0	0	0
Lewis Wharf/Granite Bldg.	187,000	0	0
Lewis Wharf/Gunwyn Property	0	197,660	197,660
Lewis Wharf/Rosebud Bldg.	16,000	0	1,550
Pilot House	36,000	0	0
Pilot House Extension	0	84,000	84,000
Sargents Wharf	0	284,000	284,000
Union Wharf	204,000	24,000	24,000
Lincoln Wharf/San Marco	341,000	0	0
Burroughs Wharf	120,000	0	0
Battery Wharf	156,000	321,000	321,000
U.S. Coast Guard	441,200	0	0
585 Commercial Street	40,000	0	0
Total - North Waterfront	1,338,200	713,000	713,000
Total - South Waterfront	2,884,250	1,171,660	941,210
Grand Total	4,222,450	1,884,660	1,654,210

(Source : BRA)

On a wharf-by-wharf basis, the expected land use scenarios are summarized as follows:

(i) Appraiser's-Stores - No land use changes are projected under either zoning scenario.

(ii) 400 Atlantic Avenue - No land use changes are projected under either zoning scenario.

(iii) Rowes/Fosters Wharf - No land use changes are projected under either zoning scenario.

(iv) India Wharf - Potential for a garage rooftop addition of 178,000 sf office use is projected under existing zoning, while no additional land use is projected under the proposed zoning.

(v) Central Wharf - With the proposed re-location of the New England Aquarium (108,000 sf) to the Charlestown Navy Yard, potential for 904,000 sf office use is projected under existing zoning. Under the proposed zoning, a total of 850,000 sf is projected, comprised of 410,000 sf office, 290,000 sf (385 rooms) hotel, 30,000 retail/cultural and 20,000 daycare/transportation.

(vi) New England Telephone - No land use changes are projected under either zoning scenario.

(vii) Long Wharf - No land use changes are projected under either zoning scenario for the Marriott, Chart House, Custom House or other blocks.

(viii) Commercial Wharf - No land use changes are projected under either zoning scenario for the Granite Building, Wood Buildings or the Finger Piers.

(ix) Lewis Wharf/Pilot House/Pilot House Extension - As proposed in the submitted PNF, 197,000 sf (263 rooms) hotel use are projected under both zoning scenarios for the Gunwyn Property. This proposal will of course be subject to review by the BRA. No land use changes are projected for the Lewis Wharf/Granite Building or Pilot House under either zoning scenario. In accordance with the Pilot House Extension RFP released by the BRA, 84,000 sf (60 units) of residential use are projected under both zoning scenarios for the Pilot House Extension. An additional 1,550 sf of office use are projected for the Rosebud Building under proposed zoning.

(x) Sargents Wharf - In accordance with the Sargents Wharf RFP released by the BRA, 284,000 sf of residential use (200 units plus 44,000 sf commercial use) are projected under either zoning scenario.

(xi) Union Wharf - An additional 24,000 sf of office use are possible under the current FAR, and are therefore projected under existing zoning. Under the proposed zoning, the same scale of residential development is projected (17 units).

(xii) Lincoln Wharf/Burroughs Wharf - No land use changes are projected under either zoning scenario.

(xiii) Battery Wharf - Under both zoning scenarios, a total redevelopment is projected, replacing the existing retail/warehousing use, as proposed in the PNF submitted by the Developer. This proposal will be subject to review by the BRA and the community. The new uses would comprise of 27,000 sf retail, 3,700 sf office and 446,300 sf (311 units) residential.

(xiv) US Coast Guard - As is the case for the remainder of the District as far as the Charlestown Bridge, no land use changes are projected under either zoning scenario.

It is clear from the above assessment that land use changes are realistically expected to take place under either zoning at only particular locations. It is also worth noting from Table 2 that the total amount of potential additional development under the proposed zoning is approximately 1,655,000 sf, compared to approximately 1,885,000 under existing zoning. Hence the existing zoning would allow approximately 14% more additional development space than the proposed zoning, although it must be borne in mind that these figures represent maximum likely build-outs, which may not necessarily be fully realized in practice.

In terms of assessing transportation impacts, it is of course the mix of land uses within the overall total, and their relative locations with respect to the transportation network, which are all important. The additional square footages for each land use are therefore summarized in Table 3.

The comparison of projected land uses for the two zoning scenarios reveals that, apart from the overall reduction in additional floor space for the proposed zoning, there is a substantial shift from additional office use under Scenario II (Existing Zoning) to residential and hotel uses under Scenario III (Proposed Zoning). This has important implications for traffic generation, in that residential and hotel uses generally exhibit more favorable characteristics than office use, which typically generates higher volumes of peak hour traffic. These implications are addressed more fully in Section 3.4 of the report under the discussion of trip generation for the traffic analysis.

TABLE 3 : PROJECTIONS OF ADDITIONAL DEVELOPMENT BY USE

Land Use	Scenario II (Existing zoning)	Scenario III (Proposed zoning)
Office (Square Feet)	1,109,700	415,250
Retail (Square Feet)	(15,000)	15,000
Hotel (Rooms)	263	648
Restaurant (Seats)	0	0
Residential (Units)	571	652
Warehouse (Square Feet)	(70,000)	(70,000)
Aquarium	(108,000)	(108,000)
Other (Daycare/Trans)	0	20,000
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Total (Square Feet)	1,884,660	1,654,210

Note: Figures in parentheses denote reductions in land use.

3.0 TRAFFIC ANALYSIS

The purpose of the traffic analysis is to quantify the traffic conditions on the roadway network adjacent to the Waterfront, and to compare the conditions expected to prevail under existing zoning (Scenario II, or "no action") with expected conditions under the proposed zoning now being considered by the BRA (Scenario III). In addition, the analysis addresses mitigation measures to deal with adverse impacts and issues arising as a result of the proposed zoning changes, as well as general transportation improvements which might be desirable in any event under either zoning condition.

3.1 Methodology

In order to assess future year traffic conditions it is necessary to develop projections of traffic volumes and turning movements on the roadway network within the study area. Traditionally, this task is carried out by developing projections based upon existing traffic patterns, which are adjusted to reflect both growth due to specific development proposals and background growth resulting from regional economic and demographic changes. In addition, traffic patterns need to be re-assigned to reflect any proposed changes or improvements in the roadway network. In the case of the Downtown area, the proposed roadway improvements are of such a strategic nature that it is not realistic to undertake this task manually, in light of the complex changes in traffic patterns which will occur as a result of the Central Artery/Third Harbor Tunnel (CA/T) project.

Accordingly, it was originally determined that it would be desirable to make use of the computer traffic projections from the CA/T design project, with simple manual adjustments to account for different analysis years and land use assumptions. Following initiation of the study, however, it was determined that the CA/T projections would not be available in time for their use in this study. As an alternative, a decision was made to generate the necessary traffic projections independently from the State, but using the same computer soft-ware and input parameters as adopted for the CA/T analysis.

The computer program used for the State analysis (TRANPLAN) was therefore adopted for this study, along with the relevant input files for land use, trip generation and roadway networks. As described later in Section 3.5 of this report, the computer model was run to derive projections for the analysis year 2000, with adjustments to reflect the different trip generations for each Waterfront land use scenario, and the regional land use conditions expected to prevail at that time. The methodology for deriving the trip generation for the Waterfront land uses is also described in Section 3.4 of the report. In addition, TRANPLAN was used to obtain traffic volumes for existing conditions, to supplement the rather inadequate data available from other sources.

Having established traffic networks for each of the three study scenarios, key intersections were identified for detailed study, and Level of Service (LOS) analysis was performed for each scenario for both morning (AM) and evening (PM) peak periods. This process provided a quantification of both existing and future year traffic conditions, and facilitated an assessment of the impacts (negative and positive) which would be expected to arise from the proposed alterations in zoning.

Finally, potential improvement measures were addressed to deal with likely traffic difficulties arising under either future year scenario. Such improvement strategies are desirable not only to alleviate specific impacts resulting from one zoning scenario as compared to another, but also to avoid unacceptable roadway conditions which might occur as a result of any development in the Waterfront District irrespective of whether the land use zoning is altered.

3.2 Existing Conditions

Access to the Waterfront is provided on a regional level almost exclusively by the Central Artery, its connections to Storrow Drive, the Massachusetts Turnpike, the Southeast Expressway, I-93 north and the Tobin Bridge. The Charlestown Bridge provides a direct link to Charlestown at the northern end of the District, and the Northern Avenue Bridge at the southern end provides one of several links across the Fort Point Channel to the South Piers area of South Boston.

Access to the Waterfront District itself at a local level is provided by Commercial Street and Atlantic Avenue, which follow the land-side boundary of the District. This route gives direct access to most of the individual wharves and other areas of land-use, and is the main circulation route for the District. Links through the North End itself tend to be indirect and circuitous, with Hanover Street being the only street which continues right through to Commercial Street.

Commercial Street is generally four lanes wide (two in each direction) with parking on both sides. As it runs the full length of the northern waterfront, it is often used by motorists for north/south movements when the Central Artery and its associated surface streets are clogged. This phenomenon is exacerbated by the fact that there is no direct surface level street connection between Atlantic Avenue and the Charlestown Bridge, and the Commercial Street route provides one of only a few alternatives. This results in a number of issues:

(i) Traffic volumes are not particularly high compared to the capacity of the roadway, but this tends to encourage higher travel speeds, particularly for through traffic. Travel speeds on Commercial Street have been observed in other studies to be 30-35 mph during both peak and off-peak hours.

(ii) There is a conflict between through traffic and local access activity, which has a detrimental impact upon the accessibility of the Waterfront District, particularly bearing in mind the absence of alternative access routes through the congested streets of the North End.

(iii) Traffic movement on Commercial Street has the effect of severing the links between the abutting North End and the Waterfront District itself. Pedestrians movements are hindered by the lack of pedestrian crossing zones.

(iv) Trolley tour buses use Commercial Street as part of their routes, and thereby add to the intrusion of traffic and parking.

One further location which is particularly prone to congestion is the intersection of Commercial Street/Causeway Street/North Washington Street/Charlestown Bridge (Keany Square). This often experiences peak hour congestion as delays in the downstream Tobin Bridge/Expressway traffic filter back to the Charlestown Bridge and hinder Commercial Street right turns.

At the southern half of the Waterfront, on Atlantic Avenue, illegally and double parked cars promote traffic delays in the area. Again, traffic bypassing the Central Artery often uses the surface streets, such as Atlantic Avenue, which follows the alignment of the Artery between Northern Avenue and Commercial Street. One particular problem location is at the intersection of Atlantic Avenue and the Northern Avenue bridge, where the Northern Avenue approach is controlled by a stop sign. This is ineffective during the PM peak hour, and, as the Central Artery becomes clogged, long queues often develop on Northern Avenue.

While the primary objective of the study is to examine future year conditions affecting the Waterfront District, it is useful to also analyze existing conditions in order to establish a basis for comparison. Although some data is available for existing traffic conditions on the roadway network adjacent to the Waterfront District, it was determined that a consistent set of data for the whole area was not available. Moreover, some of the data obtained from recent EIR's was found to be out-dated, and therefore not appropriate for this analysis.

In order to derive an appropriate set of data, TRANPLAN was run for the 1987 base year used in the CA/T analysis, thus providing link flows and intersection turning movements for the area of interest, namely Commercial Street (from the Charlestown Bridge to Atlantic Avenue) and Atlantic Avenue (from Commercial Street to the Northern Avenue Bridge). It should be appreciated that the TRANPLAN model has been adopted by the State for a regional-level analysis, and does not therefore provide wholly complete detail at a local level. However, limited manual adjustments were carried out at necessary locations where local detail was not derived, and also where roadway changes have been implemented since the 1987 base year. The 1987 base year traffic volumes have been used as the basis for analysis of existing conditions.

As previously identified, an important characteristic of existing traffic conditions on both Commercial Street and Atlantic Avenue is the extensive use of those streets by traffic seeking alternative routes to the Central Artery. During times of congestion on the Central Artery, traffic diverts to the local street network, and the Atlantic Avenue/Commercial Street corridor is frequently used as an alternative route between South Station and Charlestown. The use of Commercial Street by such traffic is encouraged by the absence of any other direct surface street connection between Atlantic Avenue and the Charlestown Bridge. It should be noted that the 1987 base year projections tend to under-estimate this phenomenon, as they generally assign more traffic to the Central Artery than actually occurs in practice.

In addition to the base year traffic projections derived using TRANPLAN, the Boston Transportation Department (BTD) is currently undertaking a design study of improvements to Commercial Street, as noted in the report introduction, Section 1. Additional data has been obtained from their consultant, and in particular balanced intersection turning movements for 1989 AM and PM peak hours, based on recent traffic surveys, were provided for that portion of the Waterfront, along with Level of Service (LOS) analyses for key intersections. The criteria for Level of Service analysis adopted in the study are summarized in the following paragraphs.

Level of Service Analysis Criteria

Level of service (LOS) analysis throughout the study was conducted using methodologies described in the 1985 Highway Capacity Manual, Special Report 209. The criteria for signalized and unsignalized intersections are summarized below.

(i) Signalized intersections:

Level of service for signalized intersections is defined in terms of the average stopped delay per vehicle. The criteria are summarized in Table 4 below.

TABLE 4 : LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service (LOS)	Stopped Delay Per Vehicle (Sec)
A	$\leq$ 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	> 60.0

(ii) Unsignalized Intersections:

In capacity calculations for an unsignalized intersection or driveway, the assumption is made that the major street traffic is not affected by the minor street movements. The capacity of the intersection is a function of: the right turns into the major road; the left turns from the major road; through traffic crossing the major road and left turns into the major road; and the number of acceptable gaps in the through traffic streams which allow turning or crossing vehicles to pass through the intersection. The critical acceptable gap is defined as "that gap for which an equal number of drivers will accept a shorter gap as will reject a longer gap." Based on a gap acceptance function, the capacity of the minor approach can be determined.

The difference between available capacity and existing demand is defined as reserve capacity and is used as the criterion for determining level of service. Table 5 below summarizes the relationship between the level of service, reserve capacity and expected traffic delay.

TABLE 5 : LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Reserve Capacity (PCPH)**	Level of Service	Expected Delay to Minor Street Traffic
> 400	A	Little or no delay
300 - 399	B	Short traffic delays
200 - 299	C	Average traffic delays
100 - 199	D	Long traffic delays
0 - 99	E	Very long traffic delays
*	F	*

* When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvements to the intersection.

** PCPH - Passenger Car Equivalents Per Hour

The LOS results for each of the key intersections on Commercial Street are included in Table 6, and the operation at each location is summarized as follows:

(1) Commercial Street/Causeway Street/North Washington Street (Keany Square)

This intersection currently experiences significant congestion during off-peak as well as peak periods, compounded by through traffic using Commercial Street as an alternative route. The BTD analysis shows overall LOS F during both AM and PM peak hours, with very high average delays.

INTERSECTION	SCENARIO I - EXISTING (1987)				SCENARIO II - 2000, EXISTING ZONING				SCENARIO III - 2000, PROPOSED ZONING			
	AM PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		PM PEAK HOUR	
	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY
1 Commercial/Causeway/North Washington	F	102	F	449	D	30	D	35	D	29	D	37
	(1989 BTD Analysis)				(With Proposed BTD Improvements)				(With proposed BTD improvements)			
2 Commercial Street/Charter Street	C	18	F	112	C	22	D	35	C	21	D	33
	(1989 BTD Analysis)				(With Proposed BTD Improvements)				(With proposed BTD improvements)			
3 Commercial Street/Hanover Street:					B	11	B	13	B	11	B	13
	(Unsignalized, 1989 BTD Analysis)				(With Proposed BTD Signalization)				(With proposed BTD signalization)			
Commercial Street NB LT	B	10	A	8								
Commercial StreetSB LT	A	6	D	23								
Hanover Street WB LT-TH-RT	D	35	F	*								
Hanover Street EB LT-TH-RT	E	37	F	*								
4 Commercial Street/Battery Street:					Year 2000 Analysis N/A				Year 2000 Analysis N/A			
	(Unsignalized, 1989 BTD Analysis)				(B)	(13)	(C)	(23)	(B)	(13)	(C)	(23)
Commercial Street NB LT	B	9	A	7	(1995 BTD Analysis w/Signalization)				(1995 BTD Analysis w/Signalization)			
Commercial Street SB LT	A	6	D	22								
Battery Street WB LT-TH-RT	D	33	E	>100								
Battery Street EB LT-TH-RT	D	29	E	>100								
5 Commercial Street/Fleet Street/ Atlantic Avenue:					Year 2000 Analysis N/A				Year 2000 Analysis N/A			
	(Unsignalized, 1989 BTD Analysis)				(C)	(16)	(D)	(32)	(C)	(16)	(D)	(32)
Fleet Street LT-RT	E	49	E	>100	(1995 BTD Analysis w/Signalization)				(1995 BTD Analysis w/Signalization)			
Commercial Street	E	68	F	*								
6 Atlantic Avenue/Commercial Wharf	B	13	C	25	B	13	C	21	B	12	C	22
7 Atlantic Avenue/Cross Street	B	12	B	11	C	19	C	24	C	20	C	22
8 Atlantic Avenue/State Street	Analysis Does Not Reflect Observed Conditions (Refer to Report Section 3.2)				C	16	D	37	C	18	D	34
9 Surface Artery/State Street	Analysis Does Not Reflect Observed Conditions (Refer to Report Section 3.2)				C	20	B	8	C	19	B	8
10 Atlantic Avenue/Milk Street	Analysis Does Not Reflect Observed Conditions (Refer to Report Section 3.2)				B	11	C	21	B	11	C	19
11 Surface Artery/Milk Street	Analysis Does Not Reflect Observed Conditions (Refer to Report Section 3.2)				B	9	B	10	B	8	B	6
12 Atlantic Avenue/India street	Analysis Does Not Reflect Observed Conditions (Refer to Report Section 3.2)				B	9	C	22	B	11	C	22
13 Surface Artery/India Street	Analysis Does Not Reflect Observed Conditions (Refer to Report Section 3.2)				B	6	B	9	B	6	B	8
14 High Street/Surface Artery/ Atlantic Avenue (SB)	Analysis Does Not Reflect Observed Conditions (Refer to Report Section 3.2)				B	6	A	5	B	6	A	5
					(Surface Artery/High Street)				(Surface Artery/High Street)			
15 Atlantic Avenue(NB)/Purchase Street/ Surface Artery	Analysis Does Not Reflect Observed Conditions (Refer to Report Section 3.2)				No Conflicts At New Intersection On Atlantic Avenue				No Conflicts At New Intersection On Atlantic Avenue			
16 Atlantic Avenue/Northern Ave. Bridge	E/F	N/A	E/F	N/A	D	27	B	15	C	24	C	15

In particular, the Causeway Street eastbound approach experiences high delays during both peaks, and the heavy left turn movement to the Charlestown Bridge is subject to long queues. Both the westbound Commercial Street and southbound Charlestown Bridge approaches show particularly high delays and queuing during the PM peak period. Only the northbound North Washington Street approach experiences reasonable levels of service, with LOS C and D in the AM and PM peaks respectively.

(2) Commercial Street/Charter Street

This intersection operates at a reasonable level of service during the AM peak, for which the BTD analysis shows overall LOS C, although the Charter Street approach is subject to slightly higher delays and LOS D. During the PM peak, operation deteriorates significantly to overall LOS F, with only the eastbound Commercial Street approach experiencing a satisfactory LOS B. The westbound traffic flows on Commercial Street are particularly high during that peak, with long delays and queuing, and, although turning movements from Charter Street are relatively small, they are subject to dis-proportionately high delays.

(3) Commercial Street/Hanover Street

This intersection is provided with traffic signals, but these are currently fixed on "flashing" operation, and the intersection therefore effectively operates as unsignalized. Accordingly, there are no particular difficulties or delays for through traffic on Commercial Street. During the AM peak, left turning traffic on Commercial Street operates well at LOS A or B, but the southbound left turn movement on Commercial Street deteriorates to LOS D during the PM peak. As a result of the high volumes of through traffic on Commercial Street and the unsignalized operation, the Hanover Street approaches experience lesser levels of service at LOS D or E in the AM peak, worsening to LOS F with long delays during the PM peak.

(4) Commercial Street/Battery Street

Although there is a nearby traffic signal at North Street which primarily assists pedestrian movements, the intersection of Commercial Street and Battery Street is unsignalized, again with no particular difficulties or delays for through traffic on Commercial Street. As is the case at the Hanover Street intersection, left turning traffic on Commercial Street operates well at LOS A or B, with the exception of the southbound left turn which deteriorates to LOS D during the PM peak. The relatively low volumes of traffic on both Battery Street approaches are subject to LOS D in the AM peak and LOS E in the PM peak.

(5) Commercial Street/Fleet Street/Atlantic Avenue

At this location, Fleet Street (one-way outbound) joins Commercial Street in close proximity to the junction of Commercial Street (also one-way outbound) and Atlantic Avenue.

Eastern Avenue, serving Sargents Wharf, joins the west side of Commercial Street just north of Fleet Street. There are no traffic signals at these locations, with the result that the high volumes of through traffic on Atlantic Avenue/Commercial Street are relatively uninterrupted. However, side street traffic on both Fleet Street and Commercial Street is subject to delays and poor levels of service, with LOS E prevailing during the AM peak and LOS F during the PM peak.

For the remainder of intersections within the study area, level of service analysis was carried out for existing conditions using the 1987 base year traffic projections derived from TRANPLAN. It should therefore be borne in mind that, as previously noted, these traffic volumes do not fully represent most recent conditions. They do, however, provide a consistent and useful basis for establishing the scale of existing conditions. Again, the criteria for level of service analysis are as previously described, and the LOS results themselves are included in Table 6. Conditions in this section of the Waterfront are summarized as follows:

(6) Atlantic Avenue/Commercial Wharf

This intersection operates at acceptable levels of service during both AM and PM peaks, with overall LOS B and C respectively. However, the relatively small volumes of traffic on Commercial Wharf East and West are subject to greater delays, with LOS D on both side streets during the AM peak and LOS D and F on Commercial Wharf West and Commercial Wharf East respectively during the PM peak. Despite the reasonable level of service on Atlantic Avenue, queue lengths are in fact fairly long.

(7) Atlantic Avenue/Cross Street

Again, existing operation at this signalized intersection provides good levels of service at overall LOS B during both peak periods, but side street traffic on the Cross Street approach is subject to greater delays and reduced LOS D during the AM peak and LOS E during the PM peak. Maximum queue lengths for through traffic on Atlantic Avenue are again relatively long, despite the good levels of service.

(8) Atlantic Avenue/State Street
(9) Surface Artery/State Street

(10) Atlantic Avenue/Milk Street
(11) Surface Artery/Milk Street

(12) Atlantic Avenue/India Street
(13) Surface Artery/India Street

These intersections operate as pairs on either side of short links between Atlantic Avenue and Surface Artery, with traffic signals phasing linked to provide synchronized operation.

Level of service analysis was carried out for each intersection separately, but this revealed generally more favorable levels of service and operation than have been observed in the field. This trend in analysis results can be attributed to a number of factors, as follows:

(i) The TRANPLAN projections generally assign more traffic to the existing Central Artery than actually occurs in practice. In practice, congestion on other parts of the existing Expressway affects the through-put of traffic up-stream, with the result that there is a greater diversion of traffic to the local surface street network. Accordingly, the volumes of through traffic on Atlantic Avenue and other local streets is probably greater than projected by TRANPLAN.

(ii) The current CANA project construction may divert some traffic to the local street network.

(iii) The 1987 base year traffic flows do not include two years of background growth between that year and current 1989 conditions.

(iv) The roadway links between respective intersections on Atlantic Avenue and Surface Artery are generally short and do not provide extensive stacking room for traffic queues. Despite the fact that there is synchronization between signal phasing, when queues exceed the relevant storage capacity, this disrupts the operation of adjacent intersections. In addition, it results in inefficient use of capacity where certain traffic movements are impeded in reaching a location where there is in fact green time available within the signal phasing.

For the above reasons, the analysis indicates an optimistic assessment of conditions at these intersections, and actual results are therefore not included in the LOS summary in Table 6. A more detailed analysis is not warranted in this study, as the future year analysis does not depend on the assessment of existing conditions, other than for comparative purposes. It can be concluded with some confidence, however, that these intersections generally exhibit poor levels of service and operating conditions during peak periods, with fairly extensive queuing and delays for both through traffic and side street traffic.

(14) High Street/Surface Artery/Atlantic Avenue(Southbound)
(15) Atlantic Avenue(Northbound)/Purchase Street/Surface Artery

Within recent years, this location has been subject to improvement in association with the Rowes Wharf development, and the previously single complex intersection has been separated into the above two intersections. The traffic signal phasing is again synchronized, but the operating conditions are subject to the same effects discussed for the preceding three pairs of intersections. Despite apparently reasonable levels of service indicated by analysis, conditions are in fact often poor, although observations indicate that queuing and delays are not as extensive as for those other locations.

(16) Atlantic Avenue/Northern Avenue Bridge

Analysis of this unsignalized intersection shows LOS F for the Northern Avenue approach during both AM and PM peaks, with extensive delays and queuing. Although these characteristics are borne out by observations in the field, it appears that the analysis may be somewhat severe in terms of the scale of queuing and delays, owing to the fact that traffic movements from the Northern Avenue Bridge are in fact assisted to some extent by the arrival of Atlantic Avenue traffic in platoons. Indeed, in the analysis of the intersection carried out for the Fan Pier/Pier 4 Environmental Impact Report, it was suggested that a more realistic analysis could be achieved by simulating the analysis as a signal controlled intersection. Such analysis produced results showing LOS E/F for both peak periods in any event. The intersection is also disrupted by queues tailing back from the Central Artery on-ramp, and there is therefore no doubt that existing conditions can be described as unacceptable during peak periods.

3.3 Trip Generation

Although the overall traffic projections for the year 2000 analyses were produced using the TRANPLAN program, it was necessary to review the trip generation for the Waterfront District land uses under each zoning scenario in order that these could be substituted for the trip generations adopted for the previously assumed land uses in the CA/T analysis. At the same time, it was also necessary to adjust the background trip generations for land use at a regional level used in the CA/T analysis in order to reflect year 2000 conditions.

Person trip generation rates, mode splits and average vehicle occupancies (AVO's) were derived for each of the land uses anticipated in the Waterfront District for both daily and peak hour conditions. These rates were developed from the Boston Transportation Department's (BTD) Access Plan Guidelines to reflect the conditions which are expected to prevail for such Waterfront locations, and included variations of mode split between the northern and southern portions of the Waterfront to account for the differences in transit accessibility.

The rates were applied to each set of land use provided by the BRA for existing zoning (Scenario II) and proposed zoning (Scenario III) to determine the incremental quantity of auto and transit trips which would be expected in addition to existing trip generation under each scenario. Where no change in land use is expected, no incremental trips were derived, and where a land use is expected to be eliminated, a "negative" increment of trips was derived. In the case of the New England Aquarium which is expected to be relocated from Central Wharf to the Charlestown Navy Yard, the "negative" increment of trips was obtained from a recent separate study of that facility.
The results of this part of the analysis are summarized in Table 7.

TABLE 7 : WATERFRONT DISTRICT - MAXIMUM POTENTIAL AUTO-TRIP GENERATION EXPRESSED AS AN ADDITION TO EXISTING TRIP GENERATION - YEAR 2000

(Total all land uses, excluding USCG site and others as described on page 5)

	EXISTING ZONING (Scenario II)	PROPOSED ZONING (Scenario III)
Daily Auto Trips - IN	2,064	1,745
Daily Auto Trips - OUT	2,064	1,745
	4,128	3,490
AM Peak Auto Trips - IN	699	478
AM Peak Auto Trips - OUT	283	334
	982	813
PM Peak Auto Trips - IN	265	323
PM Peak Auto Trips - OUT	591	501
	856	824

The overall conclusion to be drawn from this analysis is that the anticipated land uses under the proposed new zoning would generate less auto trips than those under the existing zoning, on either a daily or peak hour basis. This characteristic is due mainly to the fact that the proposed new zoning anticipates substantially more residential development than commercial office development, compared to the existing zoning. This creates a more favorable traffic generating situation for a number of reasons, as follows:

(I) Office development trip generation rates are significantly higher than those for residential development on a daily basis.

(II) The peak hour generation of trips for office development is typically greater and more concentrated than for residential development, thereby generating a higher proportion of trips during the peak hours.

(III) The directional split (i.e. the relationship of inbound trips to outbound trips) is more pronounced for office development than for residential development, so that residential development tends to offer the advantage of not concentrating trips so heavily in one direction.

It is of course not simply the total volume of traffic generated which is critical to the overall traffic analysis, as the juxtaposition of the various land uses is also critical, that is to say where the additional traffic is actually introduced to the local roadway network. This aspect is fully accounted for within the development of the final traffic projections, as described later in Section 3.4 of this report.

One final point which should be appreciated with respect to the trip generation assessment is that the trips have been derived for the total additional amount of land use expected under each zoning scenario. In practice, it is of course highly unlikely that such a full "build-out" would be achieved under either zoning, and the analysis therefore presents in all likelihood an over-estimate of traffic which would realistically be generated.

3.4 Traffic Projections

In order to derive year 2000 traffic projections for each zoning scenario, the TRANPLAN model was run with appropriate adjustments to the trip generation table. Separate runs were carried out for each scenario for both AM and PM peak hours. As identified in the preceding discussion on trip generation (Section 3.3), it was necessary to make two adjustments in this respect, as follows:

(i) For the zones containing the Waterfront district, the auto trips derived for the expected land uses were substituted for the trips previously assumed for those zones in the CA/T analysis. Hence the traffic associated with the revised land use projections for the Waterfront was loaded on the local roadway network at the relevant locations.

(ii) Local roadway traffic is comprised not only of traffic generated by the adjacent land uses, but also of traffic generated on a regional level, a large proportion of which is through traffic destined for locations remote from the study area. Indeed the latter element of roadway traffic accounts for the majority of traffic on most roadways other than local streets.

Accordingly, for all zones within the regional model other than the Waterfront zones, the trip generation table was adjusted to represent the appropriate conditions for the year 2000 analysis. This was achieved by assuming a uniform growth of land use between the base year (1987) and the design year for the CA/T analysis (2010). Trip generation on a regional level for the year 2000 was thereby substituted by interpolation between the trip generation tables for those years.

The results of the various TRANPLAN model runs provided year 2000 roadway traffic volumes for the study area, and turning movements at the key intersections under consideration, which were used for level of service analysis under the assessment of future conditions. These projections reflect the roadway network as it is expected to exist at that time, including the major improvements of the CA/T project. A limited number of manual adjustments were necessary where the model results did not provide a sufficient level of local detail for the purposes of analysis.

A comparison of the link traffic volumes for Scenario II (year 2000, existing zoning) and Scenario III (year 2000, proposed zoning) shows that there are no major differences in the resulting roadway traffic volumes for either scenario.

indeed, the projections for Scenario III are generally slightly lower than those for Scenario II, suggesting that the proposed new land use zoning may in fact have a lesser impact than the conditions which would prevail under existing zoning. In order to validate this conclusion, however, it is obviously necessary to examine the roadway operation at individual intersections, to ensure that there are no comparative adverse impacts resulting from intersection turning movements and operation.

One further observation worth noting is the comparison between either of the year 2000 projections and those for the 1987 base year conditions. Normally, a substantial increase in traffic volumes would be expected as a result of growth over a 13 year period, but it is found that only limited increases are projected, and in many cases reductions in volumes are found, in particular on the Atlantic Avenue/ Commercial Street route around the northern section of the Waterfront. This characteristic reflects the impact of the CA/T project, which is expected to divert traffic from the local surface street network and reduce the amount of traffic seeking alternative routes such as Commercial Street. Hence the impacts of growth over this period are substantially mitigated by the CA/T project, and through traffic along the Waterfront is reduced.

3.5 Future Conditions

Level of Service analysis was performed where appropriate for each of the key intersections, the results of which are summarized in Table 6, and the criteria for LOS analysis are summarized in Section 3.2 of the report. Where appropriate, the improvements being considered by the BTD under the Urban Systems Contract discussed in the report introduction (Section 1) have been incorporated in the analysis. The results of this analysis are discussed in the following paragraphs.

(1) Commercial Street/Causeway Street/North Washington Street (Keany Square)

As part of the BTD 1995 Design Study of Commercial Street, their consultant has recommended improvements to this intersection, and those improvements have been assumed to be in place for this analysis. These include the provision of an additional lane on the westbound Commercial Street approach, the re-allocation of lanes on the Causeway Street approach and some improvement in traffic signal phasing. Analysis shows that, overall, LOS D would thereby be achieved during both peak periods under either scenario. This represents a substantial improvement over the current LOS F conditions, and the delays on the southbound Charlestown Bridge approach would be significantly reduced. Although the eastbound Causeway Street approach would operate at LOS E during both AM and PM peaks, queuing and delays on that approach would also be significantly reduced. Additional analysis indicates that further improvement in traffic capacity might be achieved with alternative phasing, but this would have an undesirable impact on pedestrian movement at the intersection.

(2) Commercial Street/Charter Street

The BTD consultant has recommended improvements at this intersection also as part of the 1995 study, and these have been assumed to be in place for this analysis. The improvements include an increase to two lanes on both of the Commercial Street approaches. Analysis shows that the intersection would operate at overall LOS C and D during the AM and PM peaks, respectively, under both scenarios, with marginally lesser delays under Scenario III as compared to Scenario II. The unacceptable existing conditions during the PM peak would therefore be improved to a level which is reasonably acceptable for urban conditions, and proportionate improvement would be afforded to the Charter Street approach, even though it would operate at LOS D or E.

(3) Commercial Street/Hanover Street

The BTD consultant has recommended that the existing flashing signal at this intersection should be upgraded to a proper set of traffic signals. Analysis for both Scenario II and III shows that this would operate at an overall LOS B during either peak period. A good level of service would therefore be provided, and a substantial improvement to LOS C would be achieved for the currently bad conditions for the Hanover Street approaches.

(4) Commercial Street/Battery Street

An insufficient level of detail was derived from the TRANPLAN projections to facilitate detailed analysis at this location for the future year conditions. It is worth noting, however, that the BTD consultant has recommended signalization of the intersection in conjunction with the elimination of the existing signal at North Street, and their analysis for 1995 shows that the intersection would operate at an overall LOS B and C during the AM and PM peaks, respectively. It can reasonably be deduced that good levels of service would also be achieved for Scenario II and III conditions, bearing in mind that the year 2000 traffic volumes are expected to be less than those for the 1995 analysis. Conditions for side street traffic on Battery Street would be improved under these conditions.

(5) Commercial Street/Fleet Street/Atlantic Avenue

The BTD consultant has recommended the installation of traffic signals at Fleet Street, also controlling traffic movements on Eastern Avenue. Again, the TRANPLAN projections do not afford sufficient detail to facilitate detailed analysis of this situation for Scenario II or III conditions, but it is worth noting that the BTD analysis shows an overall LOS C and D for the 1995 AM and PM peaks respectively, although with less desirable conditions for side street traffic. It is reasonable to assume that the operation would be at least as good, if not better, for the year 2000 conditions, in light of the reduced traffic volumes for that year compared to 1995.

The proposal has the advantage of controlling and improving turning movements from side streets, and it appears to be advantageous to include Eastern Avenue (the access for Sargents Wharf) in the signalization, particularly bearing in mind the further development which is expected to take place in that vicinity under either zoning scenario.

(6) Atlantic Avenue/Commercial Wharf

The analysis at this intersection shows that the existing acceptable overall levels of service would be maintained under either Scenario II or III conditions. An overall LOS B and C would be achieved during AM and PM peaks, respectively, for both scenarios, with virtually the same levels of delay and queuing under either existing or proposed zoning conditions. Some improvement in level of service for side street turning movements is also expected, and queuing is likely to be slightly reduced in light of the overall reduction in through traffic volumes on Atlantic Avenue.

(7) Atlantic Avenue/Cross Street

The analysis shows a decrease in level of service at this intersection from the existing overall LOS B to LOS C for the year 2000 analyses, despite the reduction in traffic flows on the northern section of Atlantic Avenue. This is attributable to the reversal of traffic flow direction on Cross Street under the future roadway network circulation, and the increased volume of traffic from Atlantic Avenue south which it will carry, requiring a substantial signal phase for northbound left turns while southbound movements on Atlantic Avenue are halted. Notwithstanding this situation, the overall level of service is acceptable, and similar conditions are achieved under either land use scenario. Slightly better results are obtained under existing zoning than proposed zoning for the AM peak, while the converse is the case for the PM peak.

(8) Atlantic Avenue/State Street
(9) Surface Artery/State Street

(10) Atlantic Avenue/Milk Street
(11) Surface Artery/Milk Street

(12) Atlantic Avenue/India Street
(13) Surface Artery/India Street

As is the case for existing conditions, these intersections will continue to operate as pairs on either side of short links between Atlantic Avenue and Surface Artery. Under future roadway circulation, however, Atlantic Avenue will operate as one-way northbound with Surface Artery operating as one-way southbound. This arrangement will afford more efficient traffic operation, despite the fact that the combined northbound and southbound traffic movements are slightly higher for the future year conditions.

It is anticipated that traffic signal phasing will be linked to provide synchronized operation, but level of service analysis was performed for each intersection separately in order to establish basic levels of service, and these results are included in Attachment H. Although design work for these intersections has not yet been finalized by the State, basic assumptions were made about roadway geometry based on the current schematic layouts.

It can be seen from the results that good overall levels of service are predicted under both scenarios, comprised mainly of LOS B and C. Only the Atlantic Avenue/State Street intersection shows a slightly worse overall LOS D during the PM peak period. Generally, the delays and queuing are marginally better for the proposed new zoning scenario as compared to the existing zoning scenario, and good levels of service are predicted at the Atlantic Avenue/Milk Street intersection for both scenarios. The latter intersection will handle traffic associated with the most significant land use change in the Waterfront District under either zoning scenario, that is, the redevelopment of Central Wharf following the relocation of the New England Aquarium.

As was discussed under the assessment of existing conditions, it is likely that the predicted queue lengths may be the most critical factor in terms of traffic operation, rather than the actual levels of service at these locations. This is particularly the case on the short cross-links between Atlantic Avenue and Surface Artery, where inadequate storage may disrupt the operation of adjacent intersections, and inefficient use of capacity may result where traffic movements are impeded in making use of available green times. The analysis indicates that, although average queue lengths may be accommodated satisfactorily, maximum queue lengths are likely to result in problems in the following situations:

(i) Atlantic Avenue/State Street - State Street eastbound approach during PM peak for Scenarios II and III; State Street westbound approach during PM peak for Scenarios II and III; Atlantic Avenue northbound approach during PM peak for Scenarios II and III.

(ii) Atlantic Avenue/Milk Street - Milk Street eastbound approach during AM peak for Scenario II.

(iii) Atlantic Avenue/India Street - India Street eastbound approach during PM peak for Scenarios II and III.

(iv) Surface Artery/State Street - State Street westbound approach during PM peak for both Scenarios II and III.

(v) Surface Artery/India Street - India Street westbound approach during AM and PM peaks for Scenarios II and III.

(14) Surface Artery/High Street

The future layout of this intersection is greatly simplified compared to the existing arrangement, and accordingly good level of service conditions are expected for the future year conditions. Overall LOS B and A would be achieved during the AM and PM peaks, respectively, for either zoning scenario, and acceptable delays and queuing are predicted. Conditions would be virtually the same for Scenario II and III.

(15) Atlantic Avenue/High Street

This newly created intersection would not experience any conflicting traffic movements, and would therefore operate satisfactorily under all conditions. Traffic signal control would obviously not be required, although this might be considered for the benefit of pedestrian control.

(16) Atlantic Avenue/Northern Avenue Bridge

The existing Northern Avenue Bridge is scheduled to be replaced by a new structure located to the south of its current location, roughly in alignment with Oliver Street. Hence the future arrangement of this intersection will be significantly different from the existing layout, and will include a southbound extension of Oliver Street over the depressed Central Artery. It is anticipated that the new intersection will be controlled by traffic signals, and analysis shows an overall LOS D and B during the AM and PM peaks, respectively, for Scenario II, and LOS C during both peak periods for Scenario III. These conditions represent a significant improvement under either zoning scenario as compared to the existing conditions, and the extensive queuing and delay for traffic on the Northern Avenue Bridge approach should be substantially reduced.

3.6 Summary of Traffic Analysis Results

Despite the poor existing traffic conditions on the local roadway network serving the North End/Downtown Waterfront District, the analysis of future year conditions under either existing zoning or the proposed new zoning indicates that generally favorable conditions are likely to be achieved. This can largely be attributed to the impact of the Central Artery/Third Harbor Tunnel project, which is expected to have the effect of reducing the current diversion of traffic to the local surface streets. Most importantly for the northern portion of the Waterfront, the roadway proposals will reduce the extent of traffic which currently utilizes the Atlantic Avenue/Commercial Street corridor as an alternative route. This is mainly as a result of the improved capacity of the Artery, but also as a result of the more direct surface street links which will be created on the north-south corridor as part of that project. In addition, the project includes the opportunity for re-design of intersections and circulation along Atlantic Avenue/Surface Artery.

Other roadway proposals which will affect the Waterfront District include the following:

(i) The CANA project will have beneficial impact upon access to the District, and, in conjunction with the improvements in City Square in Charlestown, should also reduce the congestion at the Commercial Street/Causeway Street/North Washington Street/Charlestown Bridge intersection, as borne out by the analysis.

(ii) The Charlestown Bridge is to be reconstructed to provide a six-lane layout, and the proposal is currently under design. This will be carried out independently of the CANA project, but construction is to be coordinated with it. This will obviously enhance access to the Waterfront District.

(iii) Upgrading of the North Station arterial street system is currently in the design phase, under which Merrimac Street, Causeway Street and Lomasney Way, along with access from Storrow Drive and areas to the north, will be improved.

(iv) As already discussed, the BTD's consultant is currently undertaking a design study of engineering improvements for Commercial Street, and potential traffic, access and pedestrian improvements are likely to be realized as a result.

(v) The construction of the new Northern Avenue Bridge should improve the poor conditions which currently prevail at the existing intersection with Atlantic Avenue, although significant relief will not be achieved until the Third Harbor Tunnel project is completed.

A further conclusion of the analysis is that the land use development expected to occur under the proposed new zoning does not result in any adverse traffic impact which would not be expected under the existing zoning. Indeed the traffic impact of the proposed new zoning is, if anything, marginally more favorable than that associated with the existing zoning. This is mainly as a result of the less intensive traffic generating characteristics of the substantial residential element of land use under that scenario, as compared to the commercial office development possible under existing zoning.

It must of course be appreciated that this study has been conducted at an overall district level, and does not therefore seek to present the depth of analysis which might be appropriate for an Environmental Impact Report. Nonetheless, the analysis at key locations indicates few adverse traffic impacts, even in the vicinity of the most significant expected change of land use at Central Wharf. It is clearly desirable, however, to ensure that each new land use development proposal is studied and assessed in detail as and when it arises, whether or not the new zoning is implemented. Again, the extended requirements for review under Article 31 contained in the proposed new zoning will greatly assist this process, as individual developments in excess of 10,000 sf floor area will be subject to review, and will be required to submit an Access Plan to the BTD. The current threshold for Article 31 review is 100,000 sf floor area for projects in the Downtown and Back Bay areas.

In light of the analysis which has been carried out, it appears that the proposed new land use zoning should not result in any adverse traffic impacts, and conditions would not be materially different from "no action" conditions under existing zoning. Notwithstanding this projection, it is useful to identify a number of improvement strategies which should be pursued, either because the analysis has demonstrated a need for them, or because they are measures which should mitigate against unforeseen circumstances and enhance conditions under either zoning scenario. Appropriate improvement strategies are addressed in Section 6 of the report.

4.0 PARKING

Parking within the Waterfront District is in heavy demand, and there is a severe problem in the adjacent North End, where a residential parking permit program is in effect. Generally, the greatest problems are for public parking, although private parking on the wharves is clearly well used. On-street metered parking is provided along much of the length of both Commercial Street and Atlantic Avenue, and observations show that this is heavily used. The conversion of housing to offices along Commercial Street also has the effect of increasing parking demand in the area.

Hence, although private and residential parking needs are reasonably met within the District, there is not a good supply of public parking for visitors in and around the Waterfront, and this situation is exacerbated by walking distances and the separation of the Waterfront from the adjacent Downtown area by Commercial Street and Atlantic Avenue. The situation is somewhat easier in the southern section of the Waterfront, and in particular in the vicinity of Long Wharf and Central Wharf where the Aquarium garage affords a reasonable supply of public parking.

In 1987, the Boston Transportation Department undertook a survey of parking in the entire Downtown area. The results of this study were published in the 1987 Downtown Parking Inventory Survey, which reported conditions in each parking zone within the Downtown. However, as the Waterfront falls within several partial zones, it is not possible to review the results for that area in isolation. Accordingly, base data was provided by the BTD for the purposes of this study, and these data were analyzed to provide a profile for the Waterfront District. It should be borne in mind that this analysis reflects conditions as they prevailed at the time of the BTD survey (1987), and both supply and demand may have altered since that time. However, they do provide a useful indication of existing conditions.

The inventory provides information on the number of parking spaces in public lots, public garages, private lots and private garages, and also documents the observed weekday usage at both 10 AM and 12 PM (Noon). The entire data base was scrutinized in order to extract that information for all parking facilities relevant to the Waterfront, and ratios of supply and demand were developed for both public and private spaces. Three levels of analysis were carried out, as shown in Table 8.

First, data for all parking facilities actually contained within the Waterfront District was compiled, and this revealed that there are some 2251 public and 2076 private spaces available, with typical weekday usages of 1894 and 1451, respectively. This represents an 84% usage of public spaces, compared to a 70% usage of private spaces, or 77% usage of all spaces. This reflects the heavier demand for public parking compared to the reasonably satisfactory conditions for private parking during the daytime period. During the evening and nighttime periods, however, there is a much greater demand on private parking, as a result of the inadequate supply of residential parking.

TABLE 8 : PARKING SPACE SUPPLY/DEMAND ANALYSIS SUMMARY, 1987 BASE YEAR

	TOTAL PUBLIC PARKING			TOTAL PRIVATE PARKING			GRAND TOTAL		
	SUPPLY	DEMAND	USAGE	SUPPLY	DEMAND	USAGE	SUPPLY	DEMAND	USAGE
PARKING WITHIN DISTRICT	2251	1894	84%	2076	1451	70%	4327	3345	77%
PARKING WITHIN DISTRICT CATCHMENT	6102	4964	81%	3342	2595	78%	9444	7559	80%
PARKING WITHIN WHARF CATCHMENTS:									
1. CHARLESTOWN BRIDGE/US GSA	1316	1241	94%	832	827	99%	2148	2068	96%
2. SOFTBALL FIELD/PLAYGROUND	49	50	102%	1148	1032	90%	1197	1082	90%
3. US COAST GUARD	74	83	112%	758	567	75%	832	650	78%
4. BATTERY WHARF	513	429	84%	770	567	74%	1283	996	78%
5. BURROUGHS WHARF/LINCOLN WHARF	513	429	84%	760	567	75%	1273	996	78%
6. UNION WHARF	513	429	84%	878	649	74%	1391	1078	77%
7. SARGENTS WHARF	613	498	81%	558	389	70%	1171	887	76%
8. LEWIS WHARF/PILOT HOUSE	613	498	81%	477	293	61%	1090	791	73%
9. COMMERCIAL WHARF	768	653	85%	581	394	68%	1349	1047	78%
10. LONG WHARF	2827	1990	70%	1135	768	68%	3962	2758	70%
11. CENTRAL WHARF	2875	1908	66%	1239	886	72%	4114	2794	68%
12. INDIA WHARF	2357	2098	89%	1229	853	69%	3586	2951	82%
13. ROWES WHARF	2389	2134	89%	1124	793	71%	3513	2927	83%
14. NORTHERN AVE BRDG/APPRS' STR	1227	1080	88%	774	473	61%	2001	1553	78%
AVERAGE			81%			79%			80%

SOURCE : BTD 1987 DOWNTOWN PARKING INVENTORY SURVEY

Second, a catchment area was developed for the Waterfront District to determine what parking facilities outside the District reasonably provide parking supply for it. This catchment was based on an approximate 5 minute walk time from the land-side boundary, or a 1000 feet radius walk distance to account for irregularities in the street network and time for crossing roadways. Within this catchment, including the District itself, the analysis reveals some 6102 public and 3342 private spaces, with typical weekday usages of 4964 and 2595, respectively. This represents an improved 71% demand/supply for public spaces and a worsened 78% demand/supply for private spaces. The overall usage of spaces therefore increases to 80%. While this reflects a more realistic analysis of the overall demand/supply situation for the District, it does not of course exclude the demand/supply conditions at those facilities resulting from land uses elsewhere in the Downtown.

Third, in order to examine the variation of conditions along the length of the Waterfront, the District was split into 14 individual "wharf" locations, and similar individual catchments were developed for each. The profile of this analysis is shown in Table 8, which indicates some variation of demand/supply between locations, with particularly heavy usage for public facilities. The highest demands are shown to be at the northern and southern extremities of the District, with reasonable conditions again prevailing in the vicinity of Long Wharf and Central Wharf. It should be noted that the catchments for individual locations do overlap.

Quantitative analysis of future conditions is difficult to determine, especially because the District is subject to the Downtown Parking Freeze. As a result, there is little potential for future new parking available to the public, and new parking facilities will only be built in association with specific developments. Hence only parking required to sustain those developments will be provided, and future conditions are therefore likely to neither worsen nor improve given the assumption that any new land use will be self-sufficient. Indeed, this implies that there would be little difference in resulting parking conditions under either zoning scenario, as long as appropriate parking provisions are made.

This situation has an important implication when considering land use zoning, in that it provides the opportunity to restrict the amount of new parking, in particular for commercial development. While residential parking will need to be provided at an appropriate level, the amount of parking for commercial development can be more realistically restricted. The possibility of limiting parking supply for commercial development in order to encourage transit use and reduce auto trips is discussed in Section 7 of the report under mitigation strategies. Equally, the demand for parking can be influenced by measures to increase transit use.

Finally, it is worth noting that proposals have been suggested to provide between 2,000 - 3,000 parking spaces on air rights over railroad tracks at South Station. This would be of some benefit to the extreme southern end of the District, but, in the absence of suitable transit links, it would not realistically serve the remainder of the Waterfront as a whole. In addition, parking to be included in the development proposals for the North Station area may provide some benefit for the northern end of the District.

5.0 TRANSIT / WATER TRANSPORTATION

5.1 Existing Transit Facilities

The Waterfront District is served by three of the four rapid transit lines, although accessibility to stations, with the exception of the Blue Line Aquarium Station in the southern section of the District, is generally poor. The Green and Orange Lines serve the District at North Station, just outside its extreme western boundary, and approximately 0.9 miles from the most distant point in the District. Green and Orange Line service is also provided at Haymarket Station, which is again remote from most of the waterfront locations. Aquarium Station is located at Long Wharf within the District, and provides access to the Blue Line. While the Red Line does not serve the district, it can be accessed via a transfer from either the Orange or Green Lines, or by walking to South Station, approximately 0.3 miles to the nearest point and 1.2 miles from the most distant point in the area.

Commuter rail access is available at North Station and South Station. Four (4) commuter rail lines terminate at North Station: the Fitchburg/ Gardner, Lowell, Haverhill/Reading and Rockport/Ipswich lines. An additional five (5) commuter rail lines terminate at South Station: the Framingham, Needham, Forge Park/495, Attleboro/Stoughton and Fairmount/ Readville lines. Again, these transit services are remote from most of the Waterfront District itself.

Bus service is also provided by a number of lines, including Routes 6, 92, 93, 111, 325, 326, 352, 353, 354, 400, 426, 440 and 450. None of these routes directly serves the Waterfront, with the exception of Route 6 along Hanover Street, Battery Street, Commercial Street and Atlantic Avenue. Otherwise, bus service must be accessed in the vicinity of Haymarket, although Routes 92, 93 and 111 can be accessed at North Washington Street/Charlestown Bridge. These services are summarized in Table 9, which indicates the location of the closest boarding points to the District. Ridership data was provided by the MBTA for these services, but analysis of this information did not enable specific Waterfront ridership to be identified, and quantitative analysis is not therefore possible for this study.

Passenger ferry services provide connections from the Waterfront District at Long Wharf to the Charlestown Navy Yard, and from Rowes Wharf to Logan Airport and Hingham on the South Shore. The service from Long Wharf is within a short walk of most of the area, while services at Rowes Wharf are located further south of the area and are not as easily accessed.

Although there is excellent transit service close to the District, with the exception of the Blue Line and Charlestown Water Shuttle, most do not serve the Waterfront directly. Quantitative analysis of transit ridership and capacity is neither feasible, nor indeed necessary, in the context of this study. It can reasonably be assumed, however, that transit capacity is not a constraint for the District, and that transit accessibility is the overriding issue.

TABLE 9 : MBTA BUS ROUTES SERVING THE WATERFRONT DISTRICT

Route No.	Destinations	Nearest Boarding Point
6	Marine Indust. Park - Sth Station/H'Mkt	Battery/C'cial/Atlantic
92	Assembly Square - Downtown via Sullivan	Nth W'ton/C'town Bridge
93	Sullivan Station - Downtown	Nth W'ton/C'town Bridge
111	Woodlawn - Haymarket Station	Nth W'ton/C'town Bridge
325	Elm Street - Haymarket Station	Haymarket
326	West Medford - Haymarket Station	Haymarket
352	Burlington - Boston	Haymarket
353	Burlington Industrial Area - Boston	Haymarket
354	Woburn - Boston	Haymarket
400	Lynn - Boston via Western Avenue	Haymarket
426	Saugus - Haymarket Station	Haymarket
440	Lynn - Boston via Gen. Electric Bridge	Haymarket
450	Salem - Boston	Haymarket

5.2 Future Transit Improvements

A number of improvements to transit services which affect service to the Waterfront District are underway or are proposed. These include the following:

(i) Blue Line modifications to increase train lengths from four cars to six cars and the reconstruction of the Aquarium Station are scheduled for completion in 1992 or 1993.

(ii) The South Boston Piers/Fort Point Channel Transit Project is analyzing different configurations of people mover, guided bus, surface bus and rapid rail service to improve access to and from the South Boston Piers area. The preferred MBTA scheme involves a trolley bus system operating in subway and at grade rights-of-way which would pass through South Station.

(iii) The reconstruction of the Green Line at North Station and possible extension from Lechmere to Washington Street in Ball Square (Sommerville) is being studied. The DEIS process is currently underway.

(iv) Redevelopment of North Station should provide better access to both the commuter rail and commuter bus services which serve the area.

(v) Several commuter rail extensions are in the planning and environmental review process. The most extensive of these are the proposed restoration of services on the Old Colony Lines serving the South Shore from South Station.

(vi) Green Line modifications to increase train length from two cars to three cars are currently underway, and completion is anticipated by 1991.

While the above proposals will improve access to the downtown in general, it is unlikely that they will provide significant direct benefit to the Waterfront District. The separation of the Waterfront from most primary transit facilities remains the key factor in this respect. However, all improvements must be welcomed in terms of encouraging transit use, particularly in conjunction with other Transportation Systems Management (TSM) measures as discussed below in Section 7 of the report under Improvement Strategies. The trip generation analysis indicates that approximately 4,500 additional daily transit trips would be generated under the proposed zoning scenario, compared to approximately 8,100 under the existing zoning scenario. As transit capacity for this level of demand is not a constraint, there is no significant implication for transit under either scenario.

5.3 Expansion of Water Transportation Services

Long Wharf, located in the southern portion of the district, currently provides water shuttle services to the Charlestown Navy Yard (Pier 4), recreation service to the Harbor Islands, and various water excursion services. Rowes Wharf is the primary water transportation terminal serving the District, with passenger ferry service for South Shore commuters and airport travel.

Expanded water shuttle services have the potential to attract a significant volume of commuter travel by Waterfront residents to jobs in the Charlestown Navy Yard and the South Boston Piers area. A study recently completed by the State ("Boston Inner Harbor Water Transportation Study", October 1989) identifies the potential for expanding service from North Station to Commonwealth Pier and the Fan Pier/Pier 4 in South Boston, the Charlestown Navy Yard, and Logan Airport. In addition, the Long/Central Wharf area is recommended as a terminus for additional links to the Navy Yard and the South Boston Piers.

The recent study also identifies the potential of Lincoln, Lewis and Sargents Wharf as possible locations for demand-responsive, water taxi services. The demand forecasts for the area indicate that, even by the year 2010, potential ridership may be insufficient to warrant scheduled water shuttle services from these locations.

5.4 The Role of Public Transit

Because of the area's high density and close proximity to the downtown network of transit services, a substantial portion of future travel by Waterfront residents and workers can be attracted to public transit.

Residents of the area who work in the downtown now have ready access via the Blue, Orange and Green Lines to most work locations that are beyond a convenient walk. The Back Bay can be easily reached by the Orange and Green Lines from Haymarket and North Station or via a transfer from the Blue Line reached at Aquarium.

Commuters to the Navy Yard have excellent water shuttle service, which will be improved as development activity increases in the Yard. While few jobs currently exist in the South Boston Piers area, the expansion of the World Trade Center and eventual development of the Fan Pier, Pier 4 and other properties will greatly increase commuter travel from the Waterfront District. Water shuttle services from North Station and Long/Central Wharf to the South Boston Piers would provide the most attractive means of reaching work destinations there.

Of the other central work destinations, those in Kendall Square and Harvard Square in Cambridge, are least accessible via transit. While the Red Line serves both of these areas, Red Line access from the Waterfront District requires either two transfers or a substantial walk to North Station or Haymarket and a transfer at either Park or Downtown Crossing. In addition, a substantial number of current and future Waterfront residents will work in other urban and suburban locations having low or no cost parking and poor transit access. These "reverse commuters" are a large and rapidly growing segment in many of Boston's inner neighborhoods. Diverting these people to transit will be very difficult, since the commuting mode decision is based in large part on parking cost, and providing an attractive transit alternative for travel to dispersed, low density employment centers is difficult.

Those people who work in the Waterfront District have generally good transit access, which will be significantly improved by the many projects now in the planning and design stage by the MBTA. The key to capturing these people on transit will be the cost of long-term commuter parking in the Waterfront District and effective marketing and promotion of transit services by area employers.

6.0 PEDESTRIAN / OTHER ISSUES

The main issue for pedestrians in the Waterfront District is the separation of the wharf areas from the abutting North End and Downtown areas by Commercial Street and Atlantic Avenue/Central Artery/Surface Artery. This presents significant difficulties for both pedestrian and transit access.

On Commercial Street, the continuous volumes of relatively fast moving traffic make pedestrian movement difficult, although there are a number of signal controlled crossing points at Charlestown Bridge, Charter Street, Foster Street, Hanover Street and North Street. Conditions in the future are unlikely to be significantly different under either zoning scenario as compared to the other, but the reduction of through traffic as a result of the Central Artery/Third Harbor Tunnel projects is likely to afford some relief.

Some improvement will also be realized by the design improvements proposed under the BTD design study for Commercial Street. In particular these include the following:

(i) The improved traffic signal installation at the Commercial Street/Charlestown Bridge/Causeway Street/North Washington Street intersection would include concurrent pedestrian phasing. This intersection is particularly important owing to its location on the Freedom Trail, with high volumes of pedestrians. Indeed, although there is potential for even better improvement for traffic capacity, this is recommended as being limited in the interest of pedestrian movement.

(ii) At the Charter Street/Commercial Street intersection, pedestrian phases would be retained within the improved intersection operation.

(iii) The existing flashing signal at Foster Street would be retained for pedestrian movements, and improved new signal heads would be provided.

(iv) At the Hanover Street/Commercial Street intersection, the existing flashing signal provides for pedestrian movement on demand. Pedestrian phasing would be included every other cycle within the improved signalization proposal.

(v) Although the pedestrian signal at North Street would be removed, a pedestrian phase would be incorporated in the new traffic signals at Battery Street.

(vi) The proposed signalization at Fleet Street/Commercial Street/Eastern Avenue does not include pedestrian phasing, but it may be possible to include such a facility if signal warrants are met.

(vii) Throughout the length of Commercial Street, it is proposed to build pedestrian nodes at all crossing points, that is the extension of the sidewalk area so as to minimize the width of roadway to be crossed. This also has the benefit of properly defining on-street parking areas.

In the southern section of the Waterfront, the street network currently presents a significant barrier, with particularly high volumes of traffic, although pedestrian buttons are provided at most traffic signal installations. This situation will be assisted to a large extent when the Central Artery is depressed, but it is important that pedestrian movement be given due consideration in the design of new intersection arrangements. The environmental benefits of removing the elevated Artery will also help to produce an environment more conducive to pedestrians.

It is also worth noting that completion of the proposed Harborwalk will significantly improve pedestrian access along the Waterfront.

One further issue which is of concern in the Waterfront District is the operation of sightseeing buses, and this creates problems for residents, in particular along the northern section of the Waterfront where the presence of idling buses is an intrusion. Equally, the influx of visitors to restaurant and cruise facilities is a problem, particularly during weekends in the summer.

Within recent years, the BTD installed signs to exclude buses from the North End, and designated stopping areas for buses. However, problems still prevail with out-of-town buses exceeding the permitted stopping period, and it appears that information in this respect is not effectively managed. The BTD is proposing to instigate an overall bus study for the Downtown early next year, and this will include an analysis of the area covering the North End, Faneuil Hall and North Station. This study will address the requirements for loading and unloading by buses, and will develop a program for sightseeing buses. Policy recommendations and specific proposals resulting from the study should assist conditions in the future.

7.0 CONCLUSION / IMPROVEMENT STRATEGIES

Notwithstanding the generally favorable evaluation of future year transportation conditions in the Waterfront District, it is desirable to note potential improvement strategies which might be pursued in any event, regardless of whether or not the analysis has demonstrated a specific need. Such strategies should provide improvement of conditions in the District under either zoning scenario. The following improvement strategies are proposed for consideration:

(1) Proposed BTD Roadway Improvements

As outlined in this report, the consultant for the Boston Transportation Department has recommended a number of intersection improvements on Commercial Street as part of their 1995 Design Study under an Urban Systems Contract. The analysis in this study confirms that these are generally desirable proposals for the year 2000 conditions under either land use zoning, and their implementation should therefore be promoted. These include the following:

(i) Improved traffic signal operation at Keany Square, including the provision of an additional lane on the Commercial Street approach.

(ii) Improved traffic signal operation at the Commercial Street/Charter Street intersection, including the provision of two lanes on both Commercial Street approaches.

(iii) Implementation of full traffic signal control at the Commercial Street/Hanover Street intersection.

(iv) Installation of traffic signal control at the Commercial Street/Battery Street intersection to replace the existing signal at North Street.

(v) Installation of traffic signal control at the Commercial Street/Fleet Street/Eastern Avenue/Atlantic Avenue intersection.

(vi) In addition to these intersection improvements, the Design Study includes the general upgrading of Commercial Street over its full length from Atlantic Avenue to the Charlestown Bridge to provide a consistent cross-section with four travel lanes.

(2) Other Roadway Improvements

Although the new intersections on Atlantic Avenue and Surface Artery, which form part of the Central Artery project, have not yet been subjected to detailed design, such design should specifically address the close relationship which each has to each other. In this respect, the traffic signal control should be designed as a properly linked and coordinated system, and the potential problems with queue lengths, as identified in this analysis, should be taken into consideration.

The latter aspect may involve the provision of appropriate additional traffic lanes, which should be achievable given that each intersection will effectively be designed anew.

(3) Pedestrian Facilities

Pedestrian facilities, as recommended in the BTD Design Study of Commercial Street, should be incorporated in the various intersection improvement proposals. In addition, particular attention should be paid at the design stage to the demand for good pedestrian links across the newly created Central Artery parcels.

(4) Site Plan Review

Individual development proposals should be subject to close scrutiny, with particular emphasis on their traffic impact. A full analysis should be carried out to ensure that safe and adequate vehicular access is provided, and that no specific adverse impacts will arise on the local roadway network. The proposed new zoning does in fact extend the requirements for review under Article 31, requiring comprehensive review of any development in excess of 10,000 sf floor area. This will be beneficial in terms of scrutinizing individual projects, particularly as they will be subject to the preparation of an Access Plan for the BTD.

(5) Transportation Systems Management (TSM) Measures

Such measures might encompass a variety of techniques to influence the mode split of travel patterns to and from the Waterfront District, and thereby reduce the generation of auto trips. Potential strategies include:

(i) Limitation of parking supply in association with new commercial development to encourage the use of public transit for work trips. Conversely, new residential development should provide adequate, but not excessive, parking.

(ii) Requirement of commercial developments to implement MBTA Pass programs and other commuter mobility incentives, again to reduce the number of work auto trips and encourage the use of public transit. This in turn raises the issue of transit facilities, which is discussed elsewhere in the study. The implementation of shuttle services between large developments and strategic transit facilities should also be considered.

(iii) Requirement of commercial developments to implement ride-sharing and flexible working hour programs in order to reduce auto trip generation and spread peak hour loading.

(iv) Encouragement of preferential parking rates for high occupancy vehicles (HOV), and pricing strategies to mitigate commuter parking.

(6) Water Transportation

The potential for expanded water shuttle services, and associated land-side facilities, should be pursued, as addressed in the recent State study.

In light of the analysis which has been carried out, it appears that the proposed new land use zoning should not result in any adverse traffic impacts, and conditions would not be materially different from "no action" conditions under existing zoning. In any event, improvement strategies should be actively pursued in the interests of best accommodating future development.

Harborpark Interim Planning Overlay District TRANSPORTATION ANALYSIS FOR THE DOWNTOWN WATERFRONT DISTRICT

TECHNICAL APPENDICES

Prepared for

The Boston Redevelopment Authority

By

T A M S

TAMS Consultants, Inc.
ENGINEERS ■ ARCHITECTS ■ PLANNERS

December 1989

DRAFT

TECHNICAL APPENDICIES

HARBORPARK INTERIM PLANNING OVERLAY DISTRICT

TRANSPORTATION ANALYSIS
FOR THE DOWNTOWN WATERFRONT DISTRICT

PREPARED FOR

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BY

TAMS CONSULTANTS INC

DECEMBER, 1989

APPENDIX I - LAND USE PROJECTIONS

SCENARIOS I, II & III BY WHARF:

TOTAL SQUARE FOOTAGE, ALL USES

OFFICE SQUARE FOOTAGE

RETAIL SQUARE FOOTAGE

HOTEL ROOMS

RESTAURANT SEATS

RESIDENTIAL UNITS

OTHER USES SQUARE FOOTAGE

AQUARIUM SQUARE FOOTAGE

08-Nov-89

TOTAL SQUARE FOOTAGE

	Existing	------Additional------- Scenario II	Scenario III
Appraiser's Stores	153,000	0	0
400 Atlantic Avenue	81,000	0	0
Rowes/Foster Wharf	665,000	0	0
India Wharf	791,250 *	178,000	0
Central Wharf	108,000	796,000	742,000
New England Telephone	210,000	0	0
Marriott Long Wharf	370,000	0	0
Chart House/Custom House	75,000	0	0
Long Wharf	0	0	0
Commercial Wharf/Granite Bld	196,000	0	0
Commercial Wharf/Wood Bldgs.	32,000	0	0
Commercial Wharf/Finger Pier	0	0	0
Lewis Wharf/Granite Bldg.	137,000	0	0
Lewis Wharf/Gunwyn Property	0	197,660	197,660
Lewis Wharf/Rosebud Bldg.	15,000	0	1,550
Pilot House	36,000	0	0
Pilot House Extension	0	84,000	84,000
Sargents Wharf	0	284,000	284,000
Union Wharf	204,000	24,000	24,000
Lincoln Wharf/San Marco	341,000	0	0
Burroughs Wharf	120,000	0	0
Battery Wharf	156,000 *	321,000	321,000
U.S. Coast Guard	0	0	0
	-------	-------	-------
Total - North Waterfront	857,000	713,000	713,000
Total - South Waterfront	2,884,250	1,171,660	941,210
	-------	-------	-------
Grand Total	3,741,250 *	1,884,660	1,654,210

TRIP GENERATION TABLE

* Excludes 546,750 sf NT Garage + 20,100 sf Battery Wharf Parking + 441,197 sf U.S. Coast Guard = 1,008,047 sf Total

08-Nov-89

BRA - Harborpark IPOD
Square Footage for Existing and 2000 Harborpark

Office Square Feet

	Existing 1989	Scenario II 2000	Scenario III 2000
Appraiser's Stores	153,000		
400 Atlantic Avenue	81,000		0
Rowes/Foster Wharf	325,000		
India Wharf	3,700	178,000	
Central Wharf	0	904,000	410,000
New England Telephone	210,000		
Marriott Long Wharf	0		
Chart House/Custom House	60,000		
Long Wharf	0		
Commercial Wharf/Granite Bld	26,184		
Commercial Wharf/Wood Bldgs.	10,000		
Commercial Wharf/Finger Pier	0		
Lewis Wharf/Granite Bldg.	78,000		
Lewis Wharf/Gunwyn Property	0		
Lewis Wharf/Rosebud Bldg.	16,000		1,550
Pilot House	11,850		
Pilot House Extension	0		
Sargents Wharf	0		
Union Wharf	97,044	24,000	
Lincoln Wharf/San Marco	0		
Burroughs Wharf	0		
Battery Wharf	0	3,700	3,700
U.S. Coast Guard	unknown		
	-------	-------	-------
Total - North Waterfront	108,894	27,700	3,700
Total - South Waterfront	962,884	1,082,000	411,550
	-------	-------	-------
Grand Total	1,071,778	1,109,700	415,250

08-Nov-89

	Retail Square Feet		
	Existing 1989	Scenario II 2000	Scenario III 2000
Appraiser's Stores	0		
400 Atlantic Avenue	0		
Rowes/Foster Wharf	13,000		
India Wharf	20,000		
Central Wharf	0		30,000
New England Telephone	0		(Ret'l/Cult)
Marriott Long Wharf	0		
Chart House/Custom House	0		
Long Wharf	0		
Commercial Wharf/Granite Bld	1,816		
Commercial Wharf/Wood Bldgs.	0		
Commercial Wharf/Finger Pier	0		
Lewis Wharf/Granite Bldg.	26,000		
Lewis Wharf/Gunwyn Property	0		
Lewis Wharf/Rosebud Bldg.	0		
Pilot House	0		
Pilot House Extension	0		
Sargents Wharf	0	44,000	44,000
Union Wharf	0	(Commercial)	(Commercial)
Lincoln Wharf/San Marco	0		
Burroughs Wharf	0		
Battery Wharf	86,000	(59,000)	(59,000)
U.S. Coast Guard	unknown		
	-------	-------	-------
Total - North Waterfront	86,000	(15,000)	(15,000)
Total - South Waterfront	60,816	0	30,000
	-------	-------	-------
Grand Total	146,816	(15,000)	15,000

08-Nov-89

	Hotel Rooms		
	Existing 1989	Scenario II 2000	Scenario III 2000
Appraiser's Stores	0		
400 Atlantic Avenue	0		
Rowes/Foster Wharf	160		
India Wharf	0		
Central Wharf	0		385
New England Telephone	0		
Marriott Long Wharf	400		
Chart House/Custom House	0		
Long Wharf	0		
Commercial Wharf/Granite Bld	0		
Commercial Wharf/Wood Bldgs.	0		
Commercial Wharf/Finger Pier	0		
Lewis Wharf/Granite Bldg.	0		
Lewis Wharf/Gunwyn Property	0	263	263
Lewis Wharf/Rosewood Bldg.	0		
Pilot House	0		
Pilot House Extension	0		
Sargents Wharf	0		
Union Wharf	0		
Lincoln Wharf/San Marco	0		
Burroughs Wharf	0		
Battery Wharf	0		
U.S. Coast Guard	0		
	-------	-------	-------
Total - North Waterfront	0	0	0
Total - South Waterfront	560	263	648
	-------	-------	-------
Grand Total	560	263	648

03-Nov-89

Restaurant Seats

	Existing 1989	Scenario II 2000	Scenario III 2000
Appraiser's Stores	0		
400 Atlantic Avenue	0		
Rowes/Foster Wharf	253		
India Wharf	250		
Central Wharf	0		
New England Telephone	0		
Marriott Long Wharf	150		
Chart House/Custom House	200		
Long Wharf	0		
Commercial Wharf/Granite Bld	0		
Commercial Wharf/Wood Bldgs.	300		
Commercial Wharf/Finger Pier	0		
Lewis Wharf/Granite Bldg.	0		
Lewis Wharf/Gunwyn Property	0		
Lewis Wharf/Rosebud Bldg.	[illegible]		
Pilot House	322		
Pilot House Extension	0		
Sargents Wharf	0		
Union Wharf	0		
Lincoln Wharf/San Marco	0		
Burroughs Wharf	0		
Battery Wharf	0		
U.S. Coast Guard	0		
Total - North Waterfront	322	0	0
Total - South Waterfront	1,153	0	0
Grand Total	1,475	0	0

08-Nov-89

	Residential Units		
	Existing 1989	Scenario II 2000	Scenario III 2000
Appraiser's Stores	0		
400 Atlantic Avenue	0		
Rowes/Foster Wharf	150		
India Wharf	624		
Central Wharf	0		64
New England Telephone	0		
Marriott Long Wharf	0		
Chart House/Custom House	0		
Long Wharf	0		
Commercial Wharf/Granite Bld	93		
Commercial Wharf/Wood Bldgs.	0		
Commercial Wharf/Finger Pier	0		
Lewis Wharf/Granite Bldg.	92		
Lewis Wharf/Sunwyn Property	0		
Lewis Wharf/Rosebud Bldg.	0		
Pilot House	0		
Pilot House Extension	0	60	60
Sargents Wharf	0	200	200
Union Wharf	44		17
Lincoln Wharf/San Marco	191		
Burroughs Wharf	69		
Battery Wharf	0	311	311
U.S. Coast Guard	unknown		
Total - North Waterfront	304	571	588
Total - South Waterfront	959	0	64
Grand Total	1,263	571	652

08-Nov-89

	Warehouse/Other Square Feet			
	Existing 1989		Scenario II 2000	Scenario III 2000
Appraiser's Stores	0			
400 Atlantic Avenue	0			
Rowes/Foster Wharf	0			
India Wharf	0			
Central Wharf	0			20,000
New England Telephone	0			(Day-Care +
Marriott Long Wharf	0			Trans.)
Chart House/Custom House	0			
Long Wharf	0			
Commercial Wharf/Granite Bld	0			
Commercial Wharf/Wood Bldgs.	0			
Commercial Wharf/Finger Pier	0			
Lewis Wharf/Granite Bldg.	0			
Lewis Wharf/Gunwyn Property	0			
Lewis Wharf/Rosebud Bldg.	0			
Pilot House	0			
Pilot House Extension	0			
Sargents Wharf	0			
Union Wharf	0			
Lincoln Wharf/San Marco	0			
Burroughs Wharf	2,300	(Fireboat)		
Battery Wharf	70,000	(Warehouse)	(70,000)	(70,000)
U.S. Coast Guard	unknown			
	-------		-------	-------
Total - North Waterfront	72,300		(70,000)	(70,000)
Total - South Waterfront	0		0	20,000
	-------		-------	-------
Grand Total	72,300		(70,000)	(50,000)

08-Nov-89

	Aquarium Square Feet			
	Existing 1989		Scenario II 2000	Scenario III 2000
Appraiser's Stores	0			
400 Atlantic Avenue	0			
Rowes/Foster Wharf	0			
India Wharf	0			
Central Wharf	108,000	Aquarium	(108,000)	(108,000)
New England Telephone	0			
Marriott Long Wharf	0			
Chart House/Custom House	0			
Long Wharf	0			
Commercial Wharf/Granite Bld	0			
Commercial Wharf/Wood Bldgs.	0			
Commercial Wharf/Finger Pier	0			
Lewis Wharf/Granite Bldg.	0			
Lewis Wharf/Sunwyn Property	0			
Lewis Wharf/Rosebud Bldg.	0			
Pilot House	0			
Pilot House Extension	0			
Sargents Wharf	0			
Union Wharf	0			
Lincoln Wharf/San Marco	0			
Burroughs Wharf	0			
Battery Wharf	0			
U.S. Coast Guard	0			
Total - North Waterfront	0		0	0
Total - South Waterfront	108,000		(108,000)	(108,000)
Grand Total	108,000		(108,000)	(108,000)

APPENDIX II - TRIP GENERATION SUMMARIES

AUTO TRIP GENERATION BY WHARF, SCENARIOS I,II & III, ALL LAND USES:

DAILY TRIP ENDS

AM PEAK TRIPS IN

AM PEAK TRIPS OUT

PM PEAK TRIPS IN

PM PEAK TRIPS OUT

TOTAL AUTO TRIP GENERATION BY LAND USE, SCENARIOS I, II & III:

ALL LAND USES - DAILY, AM & PM

OFFICE - DAILY, AM & PM

RETAIL - DAILY, AM & PM

HOTEL - DAILY, AM & PM

RESTAURANT - DAILY, AM & PM

RESIDENTIAL - DAILY, AM & PM

WAREHOUSE/OTHER - DAILY, AM & PM

AQUARIUM - DAILY, AM & PM

TOTAL ALL LAND USES
(Excluding USCG Subdistrict)

DAILY AUTO TRIP ENDS

	Existing	------Additional-------	
		Scenario II	Scenario III
Appraiser's Stores	564	0	0
400 Atlantic Avenue	298	0	0
Rowes/Foster Wharf	2,771	0	0
India Wharf	1,909	640	0
Central Wharf	1,674	1,579	1,695
New Englnd Telephone	773	0	0
Marriott Long Wharf	1,852	0	0
Chart House/Custom House	668	0	0
Long Wharf	0	0	0
Commercial Wharf/Granite Bld	284	0	0
Commercial Wharf/Wood Bldgs.	708	0	0
Commercial Wharf/Finger Pier	0	0	0
Lewis Wharf/Granite Bldg.	711	0	0
Lewis Wharf/Gunwyn Property	0	997	997
Lewis Wharf/Rosebud Bldg.	59	0	6
Pilot House	764	0	0
Pilot House Extension	0	129	127
Sargents Wharf	0	898	721
Union Wharf	438	36	36
Lincoln Wharf/San Marco	349	0	0
Burroughs Wharf	134	0	0
Battery Wharf	1,102	(201)	(91)
U.S. Coast Guard	0	0	0
	-----	-----	-----
	15,058	4,118	3,490

TOTAL ALL LAND USES
(Excluding USCG Subdistrict)

AM PEAK AUTO TRIPS - IN

	Existing	------Additional------- Scenario II	Scenario III
AM PEAK TRIPS - IN			
Appraiser's Stores	85	0	0
400 Atlantic Avenue	45	0	0
Rowes/Foster Wharf	252	0	0
India Wharf	25	96	0
Central Wharf	16	474	363
New Englnd Telephone	115	0	0
Marriott Long Wharf	159	0	0
Chart House/Custom House	36	0	0
Long Wharf	0	0	0
Commercial Wharf/Granite Bld	17	0	0
Commercial Wharf/Wood Bldgs.	3	0	0
Commercial Wharf/Finger Pier	[illegible]	[illegible]	[illegible]
Lewis Wharf/Granite Bldg.	43	0	0
Lewis Wharf/Gunwyn Property	0	104	104
Lewis Wharf/Rosebud Bldg.	[illegible]	0	1
Pilot House	11	0	0
Pilot House Extension	0	2	2
Sargents Wharf	0	12	9
Union Wharf	55	13	1
Lincoln Wharf/San Marco	5	0	0
Burroughs Wharf	2	0	0
Battery Wharf	15	(1)	(0)
U.S. Coast Guard	0	0	0
	-----	-----	-----
	907	699	478

TOTAL ALL LAND USES
(Excluding USCG Subdistrict)

AM PEAK AUTO TRIPS - OUT

	Existing	------Additional------- Scenario II	Scenario III
AM PEAK TRIPS - OUT			
Appraiser's Stores	10	0	0
400 Atlantic Avenue	5	0	0
Rowes/Foster Wharf	33	0	0
India Wharf	177	11	0
Central Wharf	0	56	126
New Englnd Telephone	13	0	0
Marriott Long Wharf	73	0	0
Chart House/Custom House	4	0	0
Long Wharf	0	[illegible]	[illegible]
Commercial Wharf/Granite Bld	28	0	0
Commercial Wharf/Wood Bldgs.	[illegible]	0	[illegible]
Commercial Wharf/Finger Pier	[illegible]	[illegible]	[illegible]
Lewis Wharf/Granite Bldg.	32	[illegible]	[illegible]
Lewis Wharf/Gunwyn Property	[illegible]	48	43
Lewis Wharf/Rosebud Bldg.	[illegible]	0	[illegible]
Pilot House	1	0	0
Pilot House Extension	0	20	19
Sargents Wharf	0	69	66
Union Wharf	18	1	6
Lincoln Wharf/San Marco	54	0	0
Burroughs Wharf	20	0	0
Battery Wharf	27	78	68
U.S. Coast Guard	0	0	0
	-----	-----	-----
	556	283	324

TOTAL ALL LAND USES
(Excluding USCG Subdistrict)

PM PEAK AUTO TRIPS - IN

	Existing	------Additional------- Scenario II	Scenario III
PM PEAK TRIPS - IN			
Appraiser's Stores	14	0	0
400 Atlantic Avenue	7	0	0
Rowes/Foster Wharf	137	0	0
India Wharf	207	15	0
Central Wharf	74	4	77
New Engind Telephone	19	0	0
Marriott Long Wharf	107	0	0
Chart House/Custom House	25	0	0
Long Wharf	0	0	0
Commercial Wharf/Granite Bld	29	0	0
Commercial Wharf/Wood Bldgs.	31	0	0
Commercial Wharf/Finger Pier	0	0	0
Lewis Wharf/Granite Bldg.	41	0	0
Lewis Wharf/Gunwyn Property	0	60	60
Lewis Wharf/Rosebud Bldg.	1	0	0
Pilot House	33	0	0
Pilot House Extension	0	20	19
Sargents Wharf	0	81	74
Union Wharf	21	2	6
Lincoln Wharf/San Marco	54	0	0
Burroughs Wharf	19	0	0
Battery Wharf	27	83	98
U.S. Coast Guard	0	0	0
	-----	-----	-----
	345	265	323

TOTAL ALL LAND USES
(Excluding USCG Subdistrict)

PM PEAK AUTO TRIPS - OUT

	Existing	------Additional------- Scenario II	Scenario III
PM PEAK TRIPS - OUT			
Appraiser's Stores	72	0	0
400 Atlantic Avenue	38	0	0
Rowes/Foster Wharf	276	0	0
India Wharf	109	82	0
Central Wharf	131	235	290
New England Telephone	39	0	0
Marriott Long Wharf	117	0	0
Chart House/Custom House	35	0	0
Long Wharf	0	0	0
Commercial Wharf/Granite Bld	27	0	0
Commercial Wharf/Wood Bldgs.	14	0	0
Commercial Wharf/Finger Pier	0	0	0
Lewis Wharf/Granite Bldg.	65	0	0
Lewis Wharf/Gunwyn Property	0	140	140
Lewis Wharf/Rosebud Bldg.	8	0	1
Pilot House	16	0	0
Pilot House Extension	0	10	10
Sargents Wharf	0	62	50
Union Wharf	52	11	3
Lincoln Wharf/San Marco	27	0	0
Burroughs Wharf	10	0	0
Battery Wharf	66	1	9
U.S. Coast Guard	0	0	0
	-----	-----	-----
	1,252	591	501

AUTO-TRIP GENERATION - TOTAL ALL LAND USES
(Excluding USCG Subdistrict)

	Existing	Scenario II	Scenario III
		------ Additional	------
Daily Auto Trips - IN	7,529	2,064	1,745
Daily Auto Trips - OUT	7,529	2,064	1,745
	-----	-----	-----
	15,058	4,128	3,490
AM Auto Trips - IN	907	699	478
AM Auto Trips - OUT	556	283	334
	-----	-----	-----
	1,463	982	812
PM Auto Trips - IN	856	265	323
PM Auto Trips - OUT	1,252	591	501
	-----	-----	-----
	2,108	856	824

OFFICE

	Existing	Scenario II	Scenario III
		------ Additional ------	
Daily Auto Trips - IN	1,974	1,996	743
Daily Auto Trips - OUT	1,974	1,996	743
AM Auto Trips - IN	595	601	224
AM Auto Trips - OUT	68	69	25
PM Auto Trips - IN	95	96	36
PM Auto Trips - OUT	507	512	191

RETAIL

	Existing	Scenario II	Scenario III
		------ Additional ------	
Daily Auto Trips - IN	722	(80)	51
Daily Auto Trips - OUT	722	(80)	51
AM Auto Trips - IN	15	(2)	1
AM Auto Trips - OUT	9	(1)	1
PM Auto Trips - IN	44	(5)	3
PM Auto Trips - OUT	88	(10)	6

HOTEL

	Existing	Scenario II	Scenario III
		------ Additional ------	
Daily Auto Trips - IN	1,061	498	1,228
Daily Auto Trips - OUT	1,061	498	1,228
AM Auto Trips - IN	220	104	255
AM Auto Trips - OUT	102	48	118
PM Auto Trips - IN	128	60	148
PM Auto Trips - OUT	297	140	344

RESTAURANT

	Existing	Scenario II	Scenario III
		------ Additional ------	
Daily Auto Trips - IN	1,649	0	0
Daily Auto Trips - OUT	1,649	0	0
AM Auto Trips - IN	19	0	0
AM Auto Trips - OUT	0	0	0
PM Auto Trips - IN	148	0	0
PM Auto Trips - OUT	47	0	0

RESIDENTIAL

	Existing	Scenario II	Scenario III
		------ Additional	------
Daily Auto Trips - IN	1,153	614	687
Daily Auto Trips - OUT	1,153	614	687
AM Auto Trips - IN	35	19	21
AM Auto Trips - OUT	355	189	212
PM Auto Trips - IN	355	189	212
PM Auto Trips - OUT	177	94	106

WAREHOUSE/OTHER

	Existing	Scenario II	Scenario III
		------ Additional	------
Daily Auto Trips - IN	132	(128)	(128)
Daily Auto Trips - OUT	132	(128)	(128)
AM Auto Trips - IN	7	(6)	(6)
AM Auto Trips - OUT	22	(22)	(22)
PM Auto Trips - IN	1	(1)	(1)
PM Auto Trips - OUT	15	(14)	(14)

AQUARIUM

	Existing	Scenario II	Scenario III
		------ Additional	------
Daily Auto Trips - IN	837	(837)	(837)
Daily Auto Trips - OUT	837	(837)	(837)
AM Auto Trips - IN	16	(16)	(16)
AM Auto Trips - OUT	0	(0)	(0)
PM Auto Trips - IN	74	(74)	(74)
PM Auto Trips - OUT	131	(131)	(131)

APPENDIX III - LINK TRAFFIC VOLUME PROJECTIONS

1987 BASE YEAR (EXISTING), AM PEAK

1987 BASE YEAR (EXISTING), PM PEAK

YEAR 2000, SCENARIO I, AM PEAK

YEAR 2000, SCENARIO I, PM PEAK

YEAR 2000, SCENARIO II, AM PEAK

YEAR 2000, SCENARIO II, PM PEAK

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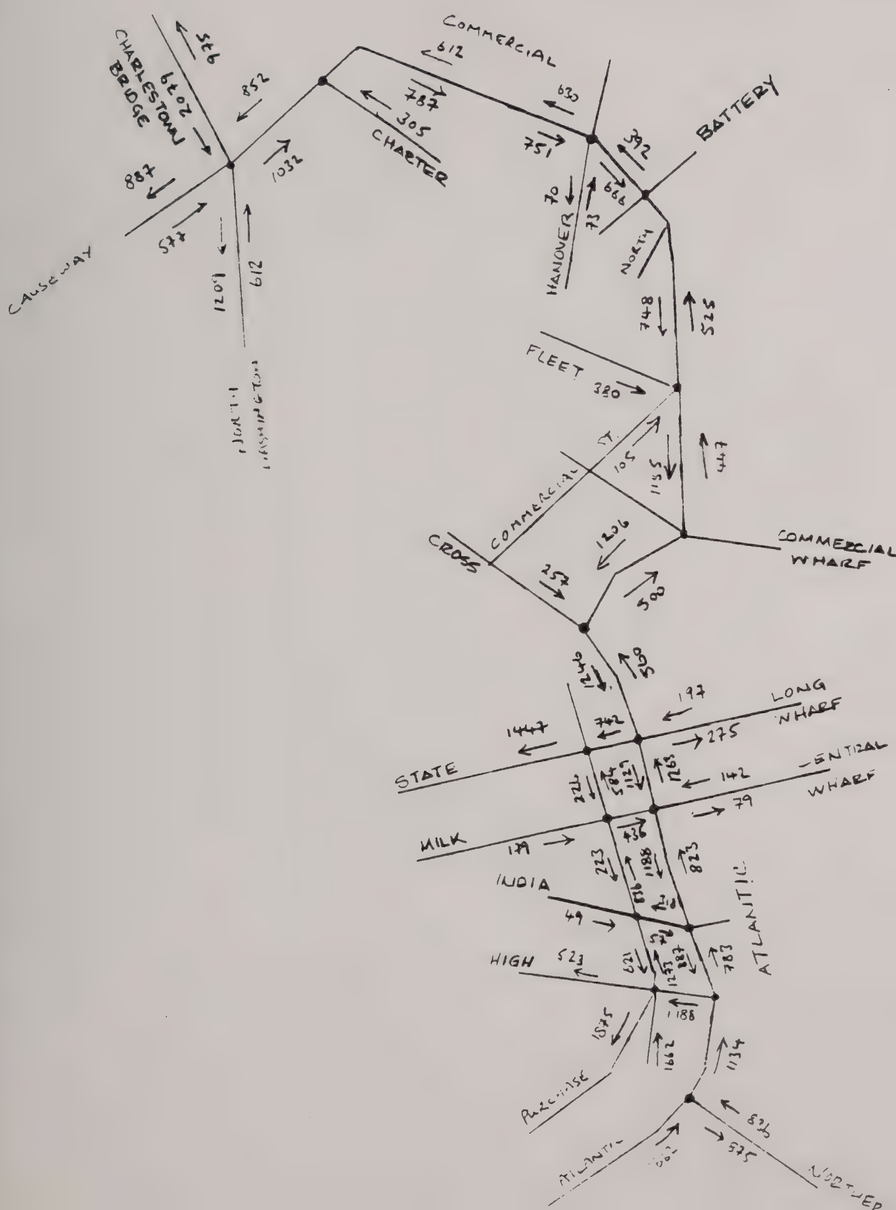
Job No. 5136-02 | Sheet 1 of 6

Project HARBORPARK IPOD | Date 11/22/89

Subject LINK VOLUMES -1987 (EXISTING) - AM PEAK | By DB

Ch'k.by



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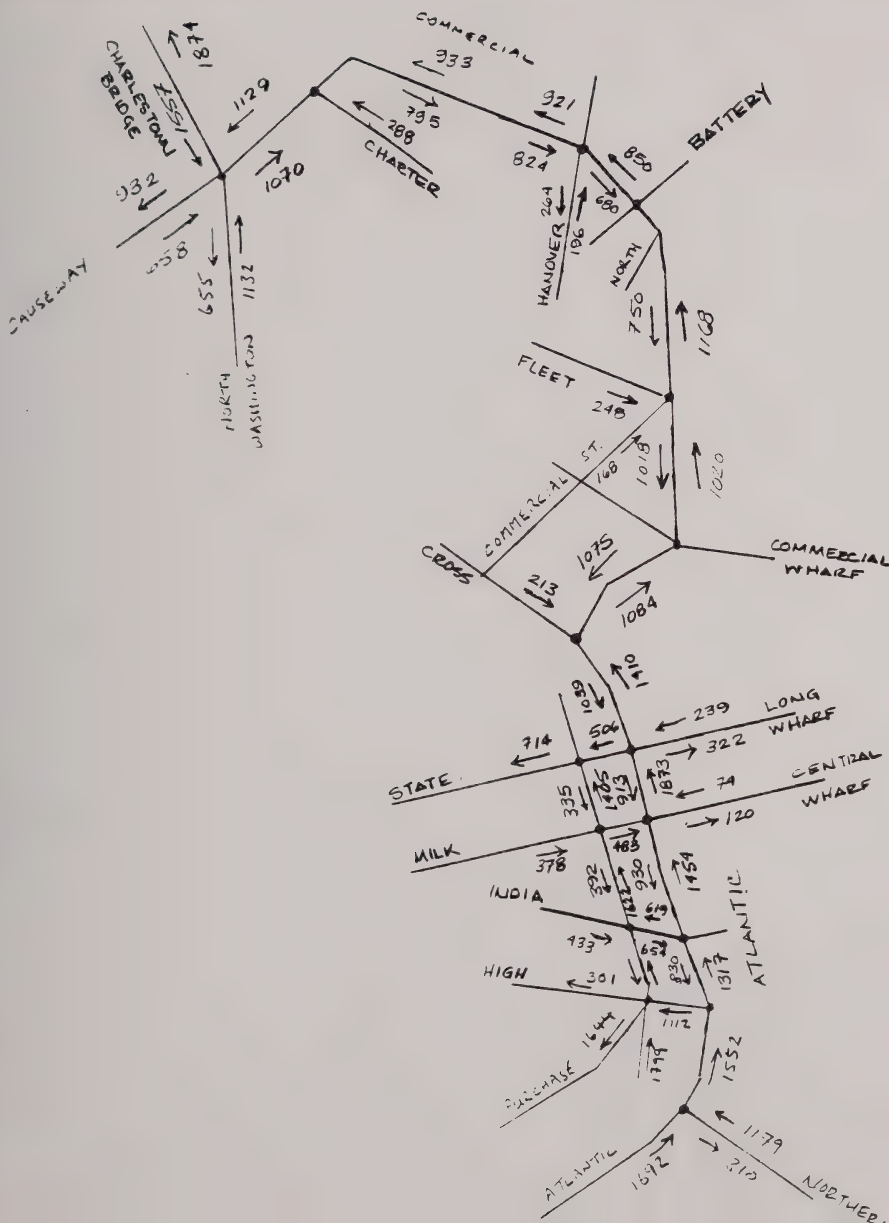
Job No. 5136-02 Sheet 2 of 6

Project HARBORPARK IPOD Date 11/22/89

Subject LINK VOLUMES -1987 (EXISTING) By EP

- PM PEAK Ch'k.by



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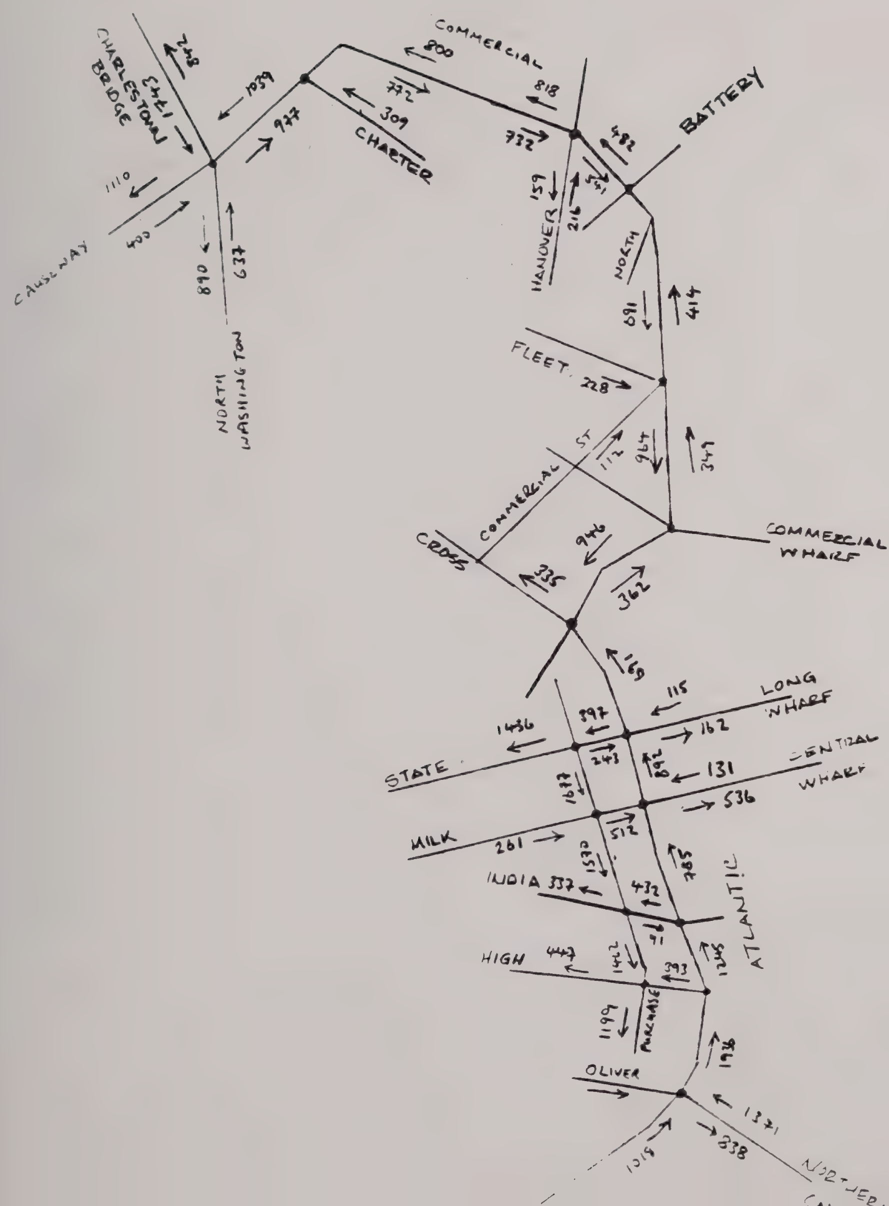
Job No. E136-02 | Sheet 3 of 6

Project HARBORPARK IPOD | Date 11/22/89

Subject LINK VOLUMES - BRA SCENARIO II | By DB

AM PEAK (2000) | Ch'k.by



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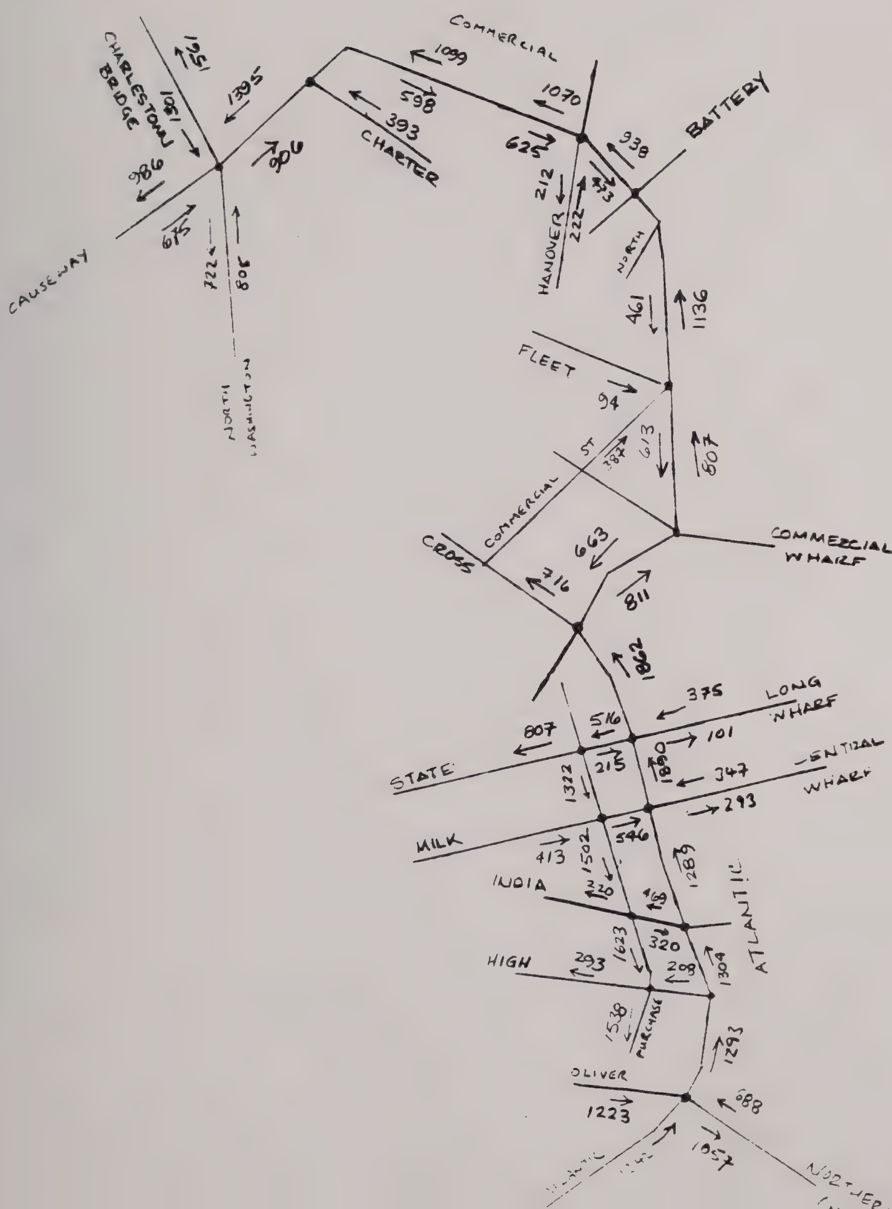
Job No. 5136-02	Sheet 4 of 6
Project HARBORPARK IPOD	Date 11/22/89
Subject LINK VOLUMES - BRA SCENARIO II	By EP.
PM PEAK (2000)	Ch'k.by



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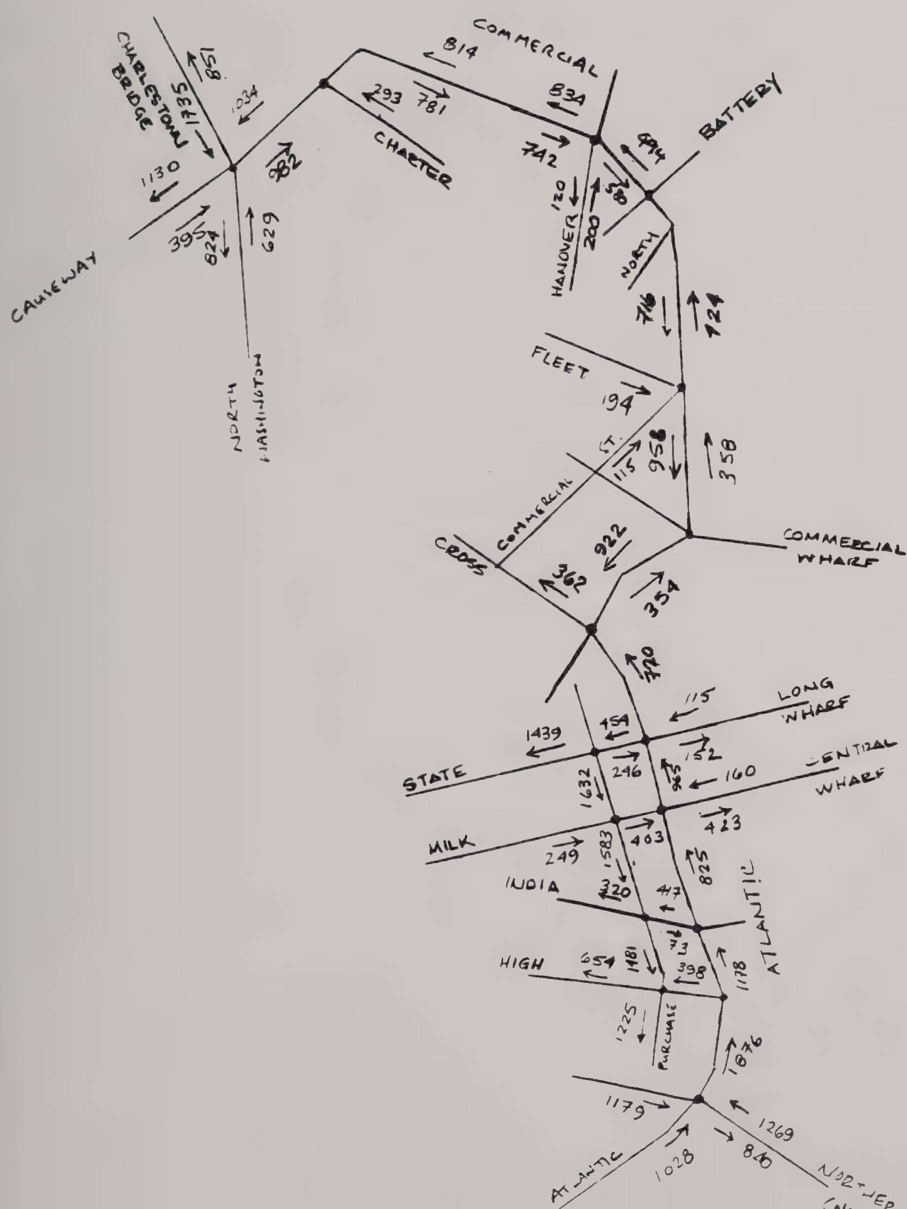
Job No.	5136-02	Sheet	5 of 6
Project	HARBORPARK IPOD	Date	11/22/89
Subject	LINK VOLUMES - BRA SCENARIO III	By	SP
	AM PEAK	Ch'k.by	



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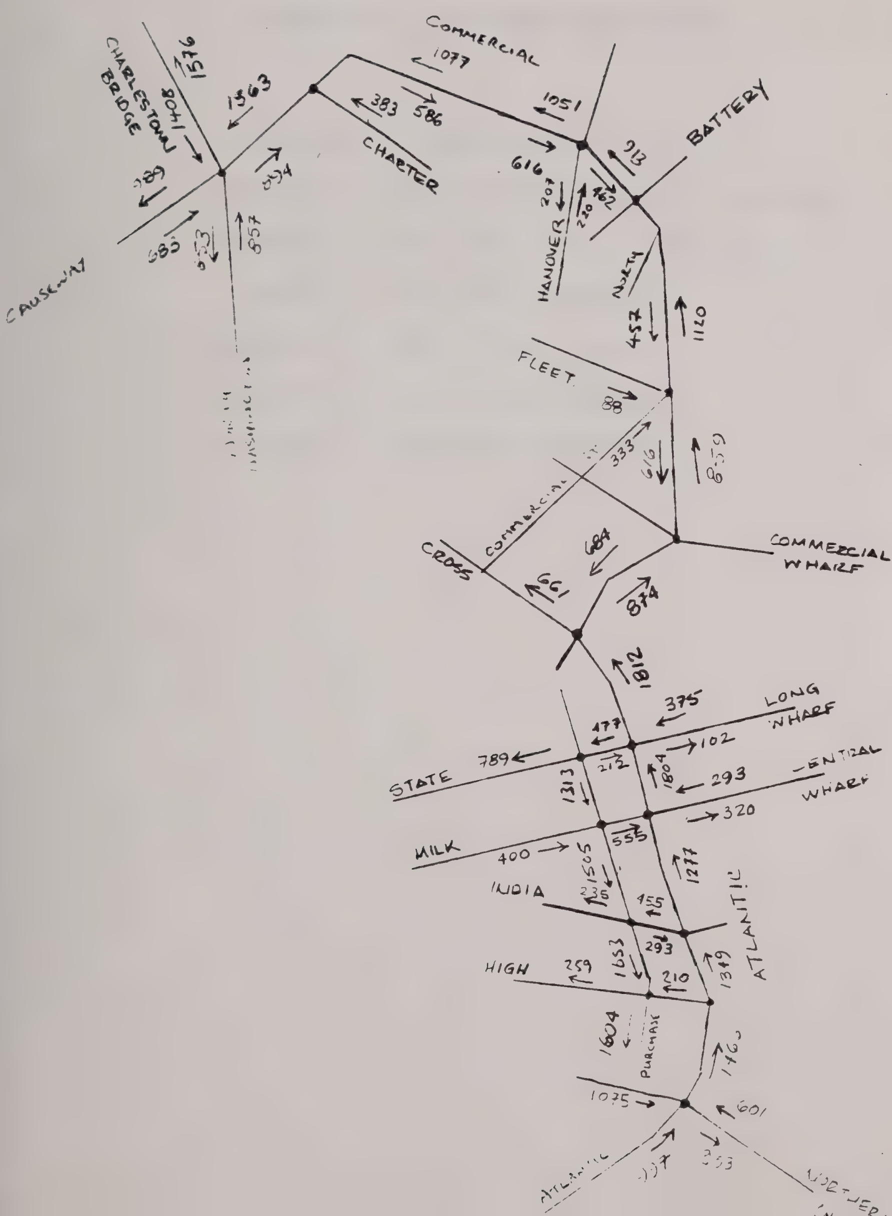
ob No. 5136-02 | Sheet 6 of 6

roject HARBORPARK IPOD | Date 11/22/89

ubject LINK VOLUMES - BRA SCENARIO III | By

-PM PEAK | Ch'k.by



APPENDIX IV - LOS ANALYSIS WORKSHEETS

SUMMARY OF LOS ANALYSIS RESULTS (TABLE 6)

SCENARIO I, 1987 BASE YEAR (EXISTING) AM ANALYSIS

SCENARIO I, 1987 BASE YEAR (EXISTING) PM ANALYSIS

SCENARIO II, YEAR 2000 AM ANALYSIS

SCENARIO II, YEAR 2000 PM ANALYSIS

SCENARIO III, YEAR 2000 AM ANALYSIS

SCENARIO III, YEAR 2000 PM ANALYSIS

I
#1
AM
(BTD ANALYSIS)

KEANY SQUARE
AM PEAK EXISTING
Date: 06-27-1989   Time: 07:26:10

1985 HCM - CHAPTER 9: SIGNALIZED   CINCH VERSION 2.0
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=   GEOMETRICS=   SIGNAL=

LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	STREET	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	CAUSEWAY ST	465	171	32	668	1	2	0	12.0	12.0	0.0	60
WB	COMMERCIAL ST	13	187	326	526	0	1	1	0.0	12.0	12.0	60
NB	N WASHINGTON ST	10	249	54	313	0	2	1	0.0	12.0	12.0	60
SB	N WASHINGTON ST	690	1217	921	2828	1	2	1	12.0	12.0	12.0	60

TOTAL VOLUME = 4335

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ Y/N	PARK MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3
WB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3
NB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3
SB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1									*	*	*		*	*	*		65.7	4	A
2				*				*				*				*	0.0	22	A
3					*	*	*										21.2	4	A
4	*	*	*												*		27.1	4	A

CYCLE= 148.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	465	171	32	.950	489	180	34
WB	13	187	326	.950	14	197	343
NB	10	249	54	.950	11	262	57
SB	690	1217	921	.950	726	1281	969

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	489	1	1.00	489	1.00	0.00
EB	TH-RT	214	2	1.05	224	0.00	0.16
WB	LT-TH	211	1	1.00	211	0.07	0.00
WB	RT	343	1	1.00	343	0.00	1.00
NB	LT-TH	273	2	1.05	286	0.04	0.00
NB	RT	57	1	1.00	57	0.00	1.00
SB	LT	726	1	1.00	726	1.00	0.00
SB	TH	1281	2	1.05	1345	0.00	0.00
SB	RT	969	1	1.00	969	0.00	1.00

KEANY SQUARE
AM PEAK EXISTING
date: 06-27-1989 time: 07:26:14

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	1.000	0.950	1685
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.976	1.000	3463
WB	LT-TH	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	1.000	0.891	1580
WB	RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.850	1.000	1507
NB	LT-TH	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	1.000	0.561	1988
NB	RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.850	1.000	1507
SB	LT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	1.000	0.583	1034
SB	TH	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	1.000	1.000	3547
SB	RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.850	1.000	1507

SUPPLEMENTAL WORKSHEET FOR
LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto	LGo
NB	148	66	2	273	273	11	0.04	2	1281	0.00	0
SB	148	66	1	726	1281	726	1.00	2	273	0.04	0

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	3600	0.356	20.245	0.074	0.461	45.461	0.539	2.338	15.133	0.121	0.561
SB	2329	0.117	54.797	0.705	1.000	10.910	0.000	0.000	1.597	0.583	0.583

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	489	1685	0.29	0.18	308	1.59	*
EB	TH-RT	224	3463	0.06	0.18	634	0.35	
WB	LT-TH	211	1580	0.13	0.14	227	0.93	
WB	RT	343	1507	0.23	0.14	216	1.59	*
NB	LT-TH	286	1988	0.14	0.44	883	0.32	
NB	RT	57	1507	0.04	0.44	669	0.08	
SB	LT	726	1034	0.70	0.44	459	1.58	*
SB	TH	1345	3547	0.38	0.44	1575	0.85	
SB	RT	969	1507	0.64	0.65	986	0.98	

CYCLE=148.0 LOST=34.0 SUM V/S CRIT= 1.22 TOTAL V/C= 1.58

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	1.59	*	0.18	148.0	52.92	308	218.90	1.00	271.82	F	56.3	170
EB	TH-RT	0.35		0.18	148.0	40.14	634	0.00	0.85	34.12	D	7.2	22
WB	LT-TH	0.93		0.14	148.0	47.61	227	32.07	0.85	67.73	F	8.9	28
WB	RT	1.59	*	0.14	148.0	53.44	216	224.90	0.85	236.59	F	35.4	107
NB	LT-TH	0.32		0.44	148.0	20.31	883	0.00	0.85	17.27	C	6.2	20
NB	RT	0.08		0.44	148.0	18.07	669	0.00	0.85	15.36	C	1.3	5
SB	LT	1.58	*	0.44	148.0	58.40	459	211.95	0.85	229.80	F	68.6	206
SB	TH	0.85		0.44	148.0	28.01	1575	3.96	0.85	27.18	D	29.3	89
SB	RT	0.98		0.65	148.0	18.87	986	19.01	0.85	32.20	D	18.2	55

DIR	STREET	DELAY	LOS
EB	CAUSEWAY ST	197.11	F
WB	COMMERCIAL ST	172.38	F
NB	N WASHINGTON ST	16.95	C
SB	N WASHINGTON ST	77.17	F

INTERSECTION DELAY =102.47 INTERSECTION LOS=F

I

#2

AM

(BTD ANALYSIS)

[redacted] ST
[redacted]

Date: 06-27-1989 Time: 07:30:27

1985 HCM - CHAPTER 9: SIGNALIZED CINCH VERSION 2.0
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=5AM GEOMETRICS=5AM SIGNAL=5AM

LOCATED IN CBD:N

VOLUME & GEOMETRICS

		VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	STREET	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	COMMERCIAL ST	0	830	0	830	0	1	0	0.0	14.0	0.0	60
WB	COMMERCIAL ST	0	527	0	527	0	1	0	0.0	14.0	0.0	60
NB	CHARTER ST	46	0	18	64	0	1	0	0.0	12.0	0.0	30
SB		0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 1421

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	Y	3	0	.950	0	Y	22.0	3
WB	0.0%	3.0%	Y	3	0	.950	0	Y	22.0	3
NB	0.0%	3.0%	Y	5	0	.950	0	Y	14.5	3
SB	0.0%	0.0%	N	0	0	.000	0		14.5	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1		*				*											60.0	4	P
2				*				*				*				*	0.0	20	P
3									*		*						14.0	4	P

CYCLE= 102.0

VOLUME ADJUSTMENT WORKSHEET

PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	830	0	.950	0	874	0
WB	0	527	0	.950	0	555	0
NB	46	0	18	.950	48	0	19
SB	0	0	0	.000	0	0	0

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	874	1	1.00	874	0.00	0.00
WB	TH	555	1	1.00	555	0.00	0.00
NB	LT-RT	67	1	1.00	67	0.72	0.28

CHARTER ST/COMMERCIAL ST
AM PEAK EXISTING
date: 06-27-1989 time: 07:30:31

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.067	0.985	1.000	0.885	1.000	1.000	1.000	1.000	1674
WB	TH	1800	1	1.067	0.985	1.000	0.885	1.000	1.000	1.000	1.000	1674
NB	LT-RT	1800	1	1.000	0.985	1.000	0.875	1.000	1.000	0.862	0.803	1073

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	874	1674	0.52	0.59	984	0.89	*
WB	TH	555	1674	0.33	0.59	984	0.56	
NB	LT-RT	67	1073	0.06	0.14	147	0.46	*

CYCLE=102.0 LOST=28.0 SUM V/S CRIT= 0.58 TOTAL V/C= 0.81

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.89	*	0.59	102.0	13.75	984	8.03	1.00	21.78	C	12.0	37
WB	TH	0.56		0.59	102.0	9.83	984	0.41	1.00	10.24	B	6.5	20
NB	LT-RT	0.46	*	0.14	102.0	30.78	147	0.00	1.00	30.78	D	1.6	6

DIR	STREET	DELAY	LOS
EB	COMMERCIAL ST	21.78	C
WB	COMMERCIAL ST	10.24	B
NB	CHARTER ST	30.78	D

INTERSECTION DELAY = 17.90 INTERSECTION LOS=C

for chosen cycle length 102.0
suggested timing phase 1 is 66.1 secs green, 4.0 secs yellow + red clear
suggested timing phase 2 is 0.0 secs green, 20.0 secs yellow + red clear
suggested timing phase 3 is 7.9 secs green, 4.0 secs yellow + red clear

I
#3
AM
(BTD ANALYSIS)

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:04-23-1989 TIME:15:47:06
HANOVER ST/COMMERCIAL ST
[redacted] EXISTING

LAST DATASETS LOADED OR SAVED
VOLUME=4AM GEOMETRICS=4AM
KEY: D

```
      D
      :
  A-- --B
      :
      C
```

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
FROM D: STOP
PREVAILING SPEED: 30 MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

MINOR STREET LANES

APPROACH: C: HANOVER ST
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: HANOVER ST
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: COMMERCIAL	B: COMMERCIAL	C: HANOVER ST	D: HANOVER ST
LEFTS	0.00	0.00	0.00	0.00
THRUS	0.00	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00	0.00

APPROACH	A: COMMERCIAL			B: COMMERCIAL			C: HANOVER ST			D: HANOVER ST		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	20	496	11	15	717	116	9	1	6	25	1	27
PHF	0.95			0.95			0.90			0.90		
ADJ VOLUME	21	522	12	16	755	122	9	1	7	28	1	30
PERCENT GRADE	0.00			0.00			0.00					
PASS CAR/HR	23			17			10	1	7	31	1	33

STEP 1 RIGHT TURNS FROM	C:HANOVER ST	D:HANOVER ST
CONFLICTING FLOWS	267	438
CRITICAL GAPS	5.5	5.5
CAPACITY	823	673
CAPACITY USED	1%	5%
IMPEDANCE FACTOR	1.00	0.97
ACTUAL CAPACITY	823	673

1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:06-23-1989 TIME:15:47:06
HANOVER ST/COMMERCIAL ST

STEP 2 LEFT TURNS FROM	B:COMMERCIAL ST	A:COMMERCIAL ST
CONFLICTING FLOWS	534	877
CRITICAL GAPS	5.5	5.5
CAPACITY	600	388
CAPACITY USED	3%	6%
IMPEDANCE FACTOR	0.99	0.97
ACTUAL CAPACITY	600	388

STEP 3 THRU MOVES FROM	C:HANOVER ST	D:HANOVER ST
CONFLICTING FLOWS	1442	1386
CRITICAL GAPS	6.5	6.5
CAPACITY	109	120
CAPACITY USED	1%	1%
IMPEDANCE FACTOR	1.00	1.00
ACTUAL CAPACITY	104	114

STEP 4 LEFT TURNS FROM	C:HANOVER ST	D:HANOVER ST
CONFLICTING FLOWS	1473	1394
CRITICAL GAPS	7.0	7.0
CAPACITY	82	95
ACTUAL CAPACITY	76	90

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM A:	23	388	365	B	9.88	0.06
LT FROM B:	17	600	583	A	6.18	0.03
ALL MOVES FROM C:	18	122	104	D	34.63	0.18
ALL MOVES FROM D:	65	162	97	E	37.06	0.67

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(BTD ANALYSIS)

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:06-23-1989 TIME:14:37:47
[redacted]

LAST DATASETS LOADED OR SAVED
VOLUME=3AM GEOMETRICS=3AM
KEY: D

A- -B
 |
 C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
FROM D: STOP
PREVAILING SPEED: 30 MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

MINOR STREET LANES

APPROACH: C: BATTERY ST
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BATTERY ST
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: COMMERCIAL	B: COMMERCIAL	C: BATTERY ST	D: BATTERY ST
LEFTS	0.00	0.00	0.00	0.00
THRUS	0.00	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00	0.00

APPROACH	A: COMMERCIAL			B: COMMERCIAL			C: BATTERY ST			D: BATTERY ST		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	47	510	6	8	739	5	12	2	9	8	2	8
PHF	0.95			0.95			0.90			0.90		
ADJ VOLUME	49	537	6	8	778	5	13	2	10	9	2	9
PERCENT GRADE	0.00			0.00			0.00					
PASS CAR/HR	54			9			15	2	11	10	2	10

STEP 1 RIGHT TURNS FROM	C:BATTERY ST	D:BATTERY ST
CONFLICTING FLOWS	272	392
CRITICAL GAPS	5.5	5.5
CAPACITY	819	712
CAPACITY USED	12	12
IMPEDANCE FACTOR	0.99	0.99
ACTUAL CAPACITY	819	712

1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:06-23-1989 TIME:14:37:47
BATTERY ST/COMMERCIAL ST

STEP 2 LEFT TURNS FROM	B:COMMERCIAL ST	A:COMMERCIAL ST
CONFLICTING FLOWS	543	793
CRITICAL GAPS	5.5	5.5
CAPACITY	593	438
CAPACITY USED	2%	12%
IMPEDANCE FACTOR	0.99	0.92
ACTUAL CAPACITY	593	438

STEP 3 THRU MOVES FROM	C:BATTERY ST	D:BATTERY ST
CONFLICTING FLOWS	1381	1382
CRITICAL GAPS	6.5	6.5
CAPACITY	121	121
CAPACITY USED	2%	2%
IMPEDANCE FACTOR	0.99	0.99
ACTUAL CAPACITY	111	111

STEP 4 LEFT TURNS FROM	C:BATTERY ST	D:BATTERY ST
CONFLICTING FLOWS	1392	1394
CRITICAL GAPS	7.0	7.0
CAPACITY	95	95
ACTUAL CAPACITY	86	86

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM A:	54	438	384	B	9.38	0.14
LT FROM B:	9	593	584	A	6.17	0.02
ALL MOVES FROM C:	28	136	108	D	33.31	0.26
ALL MOVES FROM D:	22	147	125	D	28.90	0.18

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(BTD ANALYSIS)

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:06-23-1989          TIME:14:10:59
FLEET ST/C[redacted]
[redacted] EXISTING

LAST DATASETS LOADED OR SAVED
VOLUME=2AM        GEOMETRICS=2AM
KEY: A- -B
        :
        C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: FLEET ST
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO


SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH        A: COMMERCIAL  B: COMMERCIAL  C: FLEET ST
LEFTS             0.00           0.00           0.00
THRUS             0.00           0.00           0.00
RIGHTS            0.00           0.00           0.00


APPROACH        A: COMMERCIAL  B: COMMERCIAL  C: FLEET ST
                 LT   TH   RT   LT   TH   RT   LT   TH   RT
VOLUME            0  725    0    0  555    0   42    0   31
PHF              0.95           0.95           0.90
ADJ VOLUME        0  763    0    0  584    0   47    0   34
PERCENT GRADE    0.00           0.00           0.00
PASS CAR/HR       0              0             51    0   38


STEP 1 RIGHT TURNS FROM     C:FLEET ST
CONFLICTING FLOWS                    382
CRITICAL GAPS                        5.5
CAPACITY                             720
ACTUAL CAPACITY                      720


STEP 2 LEFT TURNS FROM     B:COMMERCIAL ST
CONFLICTING FLOWS                    763
CRITICAL GAPS                        5.5
CAPACITY                             450
CAPACITY USED                         0%
IMPEDANCE FACTOR                    1.00
ACTUAL CAPACITY                      450
```

1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:06-23-1989 TIME:14:10:59
FLEET ST/COMMERCIAL ST

STEP 3 LEFT TURNS FROM	C:FLEET ST	
CONFLICTING FLOWS		1347
CRITICAL GAPS		7.0
CAPACITY		103
ACTUAL CAPACITY		103

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
ALL MOVES FROM C:	89	163	73	E	49.09	1.22

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5 (B)

AM

(BTD ANALYSIS)

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:06-23-1989 TIME:14:03:57
[redacted] EXISTING

LAST DATASETS LOADED OR SAVED
VOLUME=1AM GEOMETRICS=1AM
KEY: A- -B
:
C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
PREVAILING SPEED: 30 MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COMMERCIAL ST
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: COMMERCIAL	B: ATLANTIC AV	C: COMMERCIAL
LEFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: COMMERCIAL			B: ATLANTIC AV			C: COMMERCIAL		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	725	0	0	555	0	50	0	25
PHF	0.95			0.95			0.90		
ADJ VOLUME	0	763	0	0	584	0	56	0	28
PERCENT GRADE	0.00			0.00			0.00		
PASS CAR/HR	0			0			61	0	31

STEP 1 RIGHT TURNS FROM	C:COMMERCIAL ST
CONFLICTING FLOWS	382
CRITICAL GAPS	5.5
CAPACITY	720
ACTUAL CAPACITY	720

STEP 2 LEFT TURNS FROM	B:ATLANTIC AVE
CONFLICTING FLOWS	763
CRITICAL GAPS	5.5
CAPACITY	450
CAPACITY USED	0%
IMPEDANCE FACTOR	1.00
ACTUAL CAPACITY	450

1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:06-23-1989 TIME:14:03:57
ATLANTIC AVE/COMMERCIAL ST

STEP 3 LEFT TURNS FROM	C:COMMERCIAL ST
CONFLICTING FLOWS	1347
CRITICAL GAPS	7.0
CAPACITY	103
ACTUAL CAPACITY	103

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
ALL MOVES FROM C:	92	145	53	E	67.79	1.73

I
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AM


```
JECT NAME: Harborpark IPOD  PROJECT NUMBER: 5136-02  BY: MW

985 HCM - CHAPTER 9: SIGNALIZED
[redacted] WHARF
[redacted] PEAK
AST DATA SET NAMES LOADED OR SAVED
LUME=6-AM         GEOMETRICS=6-AM         SIGNAL=6-AM
DCATED IN CBD:N
OLUME & GEOMETRICS
          VOLUMES          # OF LANES       LANE WIDTH       CROSS
          TH   RT  TOTAL   LT TH RT        LT   TH    RT     WALK
B   31     0   55    86    0  1  0        0.0 10.0  0.0     10
B   79     0   40   119    0  1  0        0.0 12.0  0.0     30
B   19   376  104   499    0  2  0        0.0 12.0  0.0     60
B   65  1072   18  1155    0  2  0        0.0 12.0  0.0     60

OTAL VOLUME =  1859

RAFFIC & ROADWAY CONDITIONS
              ADJ PARK                    PEDESTRIANS           ARR
R GRADE %HV   Y/N MOVES BUSES   PHF  CROSS BUT MIN TIME  TYPE
B  0.0%  3.0%   N     3     0    .900   50    N    14.5      3
B  0.0%  3.0%   Y     5     0    .900   50    Y    14.5      3
B  0.0%  3.0%   N     5     0    .900   50    Y    22.0      3
B  0.0%  3.0%   N     0     0    .900   50    Y    22.0      3

HASINGS
   EASTBOUND   WESTBOUND   NORTHBOUND   SOUTHBOUND GREEN  Y+R  PRE/ACT
   l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
   -  *  *     *  -  -                             15.9   4     A
                           *  *  *     *  *  *     56.1   4     A
            *           *           *           *   0.0  20     A

CLE=100.0  LOST=28.0  SUM V/S CRIT= 0.54 TOTAL V/C= 0.76

EVEL OF SERVICE WORKSHEET
IR LN GROUP  v/c CM g/C    C      d1     c      d2   PF    Delay LOS Avg Q  95% Q

B  LT-RT     0.52   0.16 100.0  29.30  185    0.55 0.85  25.37  D    2.2     8
B  LT-RT     0.76 * 0.16 100.0  30.56  175   14.14 0.85  37.99  D    3.4    11
B  LT-TH-RT  0.50   0.56 100.0  10.20 1153    0.02 0.85   8.69  B    6.8    21
B  LT-TH-RT  0.76 * 0.56 100.0  12.69 1785    1.59 0.85  12.14  B   15.6    48

IR Delay LOS
B  25.37  D
B  37.99  D
B   8.69  B
B  12.14  B
TERSECTION DELAY = 13.38 INTERSECTION LOS=B
```

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#7
AM

985 HCM — CHAPTER 9: SIGNALIZED

TLANTIC [redacted]

AST DATA SET NAMES LOADED OR SAVED
LUME=8-AM GEOMETRICS=8-AM SIGNAL=8-AM
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
B	128	0	129	257	0	2	0	0.0	12.0	0.0	30
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	0	560	0	560	0	2	0	0.0	12.0	0.0	60
B	0	1118	0	1118	0	2	0	0.0	12.0	0.0	60

TAL VOLUME = 1935

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	0.0%	3.0%	N	3	0	.900	50	Y	14.5	3
B	0.0%	0.0%	N	5	0	.000	0	N	14.5	0
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
			*														14.3	4	A
										*				*			57.7	4	A
3				*				*				*				*	0.0	20	A

CLE=100.0 LOST=28.0 SUM V/S CRIT= 0.46 TOTAL V/C= 0.64

LEVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	LT-RT	0.64	*	0.14	100.0	30.69	470	2.20	1.00	32.89	D	6.8	21
B	TH	0.32		0.58	100.0	8.35	2045	0.00	0.85	7.10	B	7.3	23
	TH	0.64	*	0.58	100.0	10.77	2045	0.51	0.85	9.59	B	14.6	45

IR	Delay	LOS
B	32.89	D
B	7.10	B
B	9.59	B

NTERSECTION DELAY = 11.96 INTERSECTION LOS=B

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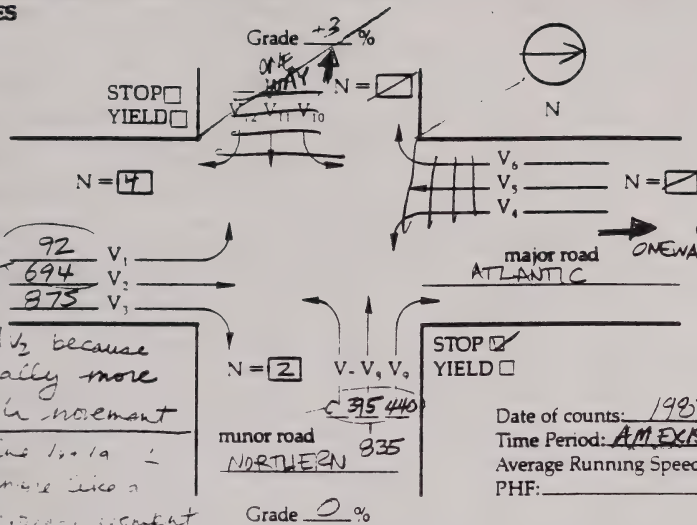
WORKSHEET FOR FOUR-LEG INTERSECTIONS

Page 1

14'
Location: [redacted] Name: ______

HOURLY VOLUMES



$V_2 = 786$

combine V_1 and V_2 because the left is really more like a through movement

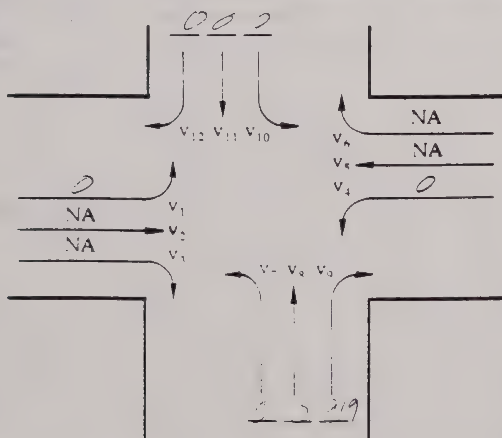
$V_9 = 835$ Combine $V_8 + V_9$ because V_8 is more like a [illegible] movement

Date of counts: 1987
Time Period: AM EXISTING
Average Running Speed: 30
PHF: ______

VOLUME ADJUSTMENTS

Movement No.	1	2	3	4	5	6	7	8	9	10	11	12
Volume (vph)	0	786	875	0	0	0	0	0	835	0	0	0
Vol. (pcph), see Table 10-1 (1.1)	0			0			0	0	919	0	0	0

VOLUMES IN PCPH



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WORKSHEET FOR FOUR-LEG INTERSECTIONS — Page 2

STEP 1: RT From Minor Street	V_9	V_{12}
Conflicting Flows, V_c	$1/2\,V_3 + V_2 = V_{c9}$ 437 + 786 = 1223 vph	$1/2\,V_6 + V_5 = V_{c12}$ 0 + 0 = 0 vph
Critical Gap, T_c (Tab. 10-2)	5.5 (sec)	______ (sec)
Potential Capacity, c_p (Fig. 10-3)	c_{p9} = 245 pcph	c_{p12} = ______ pcph
Percent of c_p Utilized	3.75 $(v_9/c_{p9}) \times 100$ = 375 %	$(v_{12}/c_{p12}) \times 100$ = ______ %
Impedance Factor, P (Fig. 10-5)	P_9 = ______	P_{12} = ______
Actual Capacity, c_m	$c_{m9} = c_{p9}$ = ______ pcph	$c_{m12} = c_{p12}$ = ______ pcph
STEP 2: LT From Major Street	V_4	V_1
Conflicting Flows, V_c	$V_3 + V_2 = V_{c4}$ 875 + 786 = 1661 vph	$V_6 + V_5 = V_{c1}$ 0 + 0 = ______ vph
Critical Gap, T_c (Tab. 10-2)	______ (sec)	______ (sec)
Potential Capacity, c_p (Fig. 10-3)	c_{p4} = ______ pcph	c_{p1} = ______ pcph
Percent of c_p Utilized	$(v_4/c_{p4}) \times 100$ = ______ %	$(v_1/c_{p1}) \times 100$ = ______ %
Impedance Factor, P (Fig. 10-5)	P_4 = ______	P_1 = ______
Actual Capacity, c_m	$c_{m4} = c_{p4}$ = ______ pcph	$c_{m1} = c_{p1}$ = ______ pcph
STEP 3: TH From Minor Street	V_8	V_{11}
Conflicting Flows, V_c	$1/2V_3+V_2+V_1+V_6+V_5+V_4=V_{c8}$ 437 + 786 + 0 + 0 + 0 + 0 = 1223 vph	$1/2V_6+V_5+V_4+V_3+V_2+V_1=V_{c11}$ 0 + 0 + 0 + 875 + 786 + 0 = 1661 vph
Critical Gap, T_c (Tab. 10-2)	______ (sec)	______ (sec)
Potential Capacity, c_p (Fig. 10-3)	c_{p8} = ______ pcph	c_{p11} = ______ pcph
Percent of c_p Utilized	$(v_8/c_{p8}) \times 100$ = ______ %	$(v_{11}/c_{p11}) \times 100$ = ______ %
Impedance Factor, P (Fig. 10-5)	P_8 = ______	P_{11} = ______
Actual Capacity, c_m	$c_{m8} = c_{p8} \times P_1 \times P_4$ ______ = ______ × ______ × ______ (pcph)	$c_{m11} = c_{p11} \times P_1 \times P_4$ ______ = ______ × ______ × ______ (pcph)
STEP 4: LT From Minor Street	V_7	V_{10}
Conflicting Flows, V_c	V_{c8} (step 3) + V_{11} + V_{12} = V_{c7} 1223 + 0 + 0 = 1223 vph	V_{c11} (step 3) + V_8 + V_9 = V_{c10} 1661 + 0 + 919 = 2580 vph
Critical Gap, T_c (Tab. 10-2)	______ (sec)	______ (sec)
Potential Capacity, c_p (Fig. 10-3)	c_{p7} = ______ pcph	c_{p10} = ______ pcph
Actual Capacity, c_m	$c_{m7} = c_{p7} \times P_1 \times P_4 \times P_{11} \times P_{12}$ ______ = ______ × ______ × ______ × ______ × ______ (pcph)	$c_{m10} = c_{p10} \times P_1 \times P_4 \times P_8 \times P_9$ ______ = ______ × ______ × ______ × ______ × ______ (pcph)

WORKSHEET FOR FOUR-LEG INTERSECTIONS

Page 3

SHARED-LANE CAPACITY

$$c_{SH} = \frac{v_l + v}{(v_l/c_{ml}) + (v_l/c_{ml})}$$ where 2 movements share a lane

$$c_{SH} = \frac{v_l + v - v_k}{(v_l/c_{ml}) + (v_l/c_{ml}) - (v_k/c_{mk})}$$ where 3 movements share a lane

MINOR STREET APPROACH MOVEMENTS 7, 8, 9

and diagram page 2 above Table 10-3

Movement	v(pcph)	c_m(pcph)	c_{SH}(pcph)	$c_R = c_{SH} - v$	LOS
7					
8					
9	919	245		-674	F

MINOR STREET APPROACH MOVEMENTS 10, 11, 12

Movement	v(pcph)	c_m(pcph)	c_{SH}(pcph)	$c_R = c_{SH} - v$	LOS
10					
11					
12					

MAJOR STREET LEFT TURNS 1, 4

Movement	v (pcph)	c_m (pcph)	$c_R = c_m - v$	LOS
1				
4				

COMMENTS:

see PM sheet

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PM
(BTD ANALYSIS)

[redacted]
PM PEAK EXISTING
Date: 06-27-1989 Time: 07:58:33

1985 HCM - CHAPTER 9: SIGNALIZED CINCH VERSION 2.0
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=6AM GEOMETRICS=6AM SIGNAL=6AM

LOCATED IN CBD:N

VOLUME & GEOMETRICS

		VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	STREET	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	CAUSEWAY ST	725	156	42	923	1	2	0	12.0	12.0	0.0	60
WB	COMMERCIAL ST	10	282	1242	1534	0	1	1	0.0	12.0	12.0	60
NB	N WASHINGTON ST	12	906	44	962	0	2	1	0.0	12.0	12.0	60
SB	N WASHINGTON ST	433	886	590	1909	1	2	1	12.0	12.0	12.0	60

TOTAL VOLUME = 5328

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3
WB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3
NB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3
SB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*	*		*	*	*		61.4	4	A
2				*				*				*				*	0.0	22	A
3					*	*	*										34.6	4	A
4	*	*	*												*		18.0	4	A

CYCLE= 148.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	725	156	42	.950	763	164	44
WB	10	282	1242	.950	11	297	1307
NB	12	906	44	.950	13	954	46
SB	433	886	590	.950	456	933	621

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	763	1	1.00	763	1.00	0.00
EB	TH-RT	208	2	1.05	219	0.00	0.21
WB	LT-TH	307	1	1.00	307	0.03	0.00
WB	RT	1307	1	1.00	1307	0.00	1.00
NB	LT-TH	966	2	1.05	1015	0.01	0.00
NB	RT	46	1	1.00	46	0.00	1.00
SB	LT	456	1	1.00	456	1.00	0.00
SB	TH	933	2	1.05	979	0.00	0.00
SB	RT	621	1	1.00	621	0.00	1.00

KEANY SQUARE
PM PEAK EXISTING
date: 06-27-1989 time: 07:58:38

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	1.000	0.950	1685
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.968	1.000	3434
WB	LT-TH	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	1.000	0.895	1588
WB	RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.850	1.000	1507
NB	LT-TH	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	1.000	0.870	3085
NB	RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.850	1.000	1507
SB	LT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	1.000	0.175	310
SB	TH	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	1.000	1.000	3547
SB	RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.850	1.000	1507

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto	LGo
NB	148	61	2	966	966	13	0.01	2	933	0.00	0
SB	148	61	1	456	933	456	1.00	2	966	0.01	0

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	3600	0.259	31.119	0.292	0.072	30.280	0.928	17.445	3.851	0.739	0.870
SB	3471	0.278	27.982	0.271	1.000	33.416	0.000	0.000	4.150	0.175	0.175

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	763	1685	0.45	0.12	205	3.71	*
EB	TH-RT	219	3434	0.06	0.12	419	0.52	
WB	LT-TH	307	1588	0.19	0.23	371	0.83	
WB	RT	1307	1507	0.87	0.23	352	3.71	*
NB	LT-TH	1015	3085	0.33	0.41	1280	0.79	
NB	RT	46	1507	0.03	0.41	625	0.07	
SB	LT	456	310	1.47	0.41	129	3.54	*
SB	TH	979	3547	0.28	0.41	1471	0.67	
SB	RT	621	1507	0.41	0.56	850	0.73	

CYCLE=148.0 LOST=34.0 SUM V/S CRIT= 2.79 TOTAL V/C= 3.62

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	3.71	*	0.12	148.0	79.27	205	955.01	1.00	1034.27	F	298.8	
EB	TH-RT	0.52		0.12	148.0	46.31	419	0.31	0.85	39.63	D	7.5	
WB	LT-TH	0.83		0.23	148.0	40.98	371	11.96	0.85	45.00	E	9.8	
WB	RT	3.71	*	0.23	148.0	249.03	352	948.54	0.85	1017.93	F	501.2	
NB	LT-TH	0.79		0.41	148.0	28.69	1280	2.94	0.85	26.89	D	23.2	
NB	RT	0.07		0.41	148.0	19.87	625	0.00	0.85	16.89	C	1.1	
SB	LT	3.54	*	0.41	148.0	32.91	129	904.24	0.85	796.58	F	136.6	
SB	TH	0.67		0.41	148.0	26.60	1471	0.92	0.85	23.40	C	22.4	
SB	RT	0.73		0.56	148.0	18.20	850	2.71	0.85	17.77	C	11.1	

DIR	STREET	DELAY	LOS
EB	CAUSEWAY ST	812.61	F
WB	COMMERCIAL ST	832.73	F
NB	N WASHINGTON ST	26.45	D
SB	N WASHINGTON ST	193.09	F

INTERSECTION DELAY =449.39 INTERSECTION LOS=F

for chosen cycle length 148.0

I
#2
PM
(BTD ANALYSIS)

CHARTER ST/COMMERCIAL ST
PM PEAK EXISTING
Date: 06-27-1989   Time: 07:35:38

1985 HCM - CHAPTER 9: SIGNALIZED   CINCH VERSION 2.0
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=5PM   GEOMETRICS=5PM   SIGNAL=5PM

LOCATED IN CBD:N

VOLUME & GEOMETRICS

		VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	STREET	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	COMMERCIAL ST	0	653	0	653	0	1	0	0.0	14.0	0.0	60
WB	COMMERCIAL ST	0	1430	0	1430	0	1	0	0.0	14.0	0.0	60
NB	CHARTER ST	35	0	24	59	0	1	0	0.0	12.0	0.0	30
SB		0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 2142

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	Y	3	0	.950	0	Y	22.0	3
WB	0.0%	3.0%	Y	3	0	.950	0	Y	22.0	3
NB	0.0%	3.0%	Y	5	0	.950	0	Y	14.5	3
SB	0.0%	0.0%	N	0	0	.000	0		14.5	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1		*				*											69.5	4	P
2				*				*				*				*	0.0	20	P
3									*		*						4.5	4	P

CYCLE= 102.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	653	0	.950	0	687	0
WB	0	1430	0	.950	0	1505	0
NB	35	0	24	.950	37	0	25
SB	0	0	0	.000	0	0	0

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	687	1	1.00	687	0.00	0.00
WB	TH	1505	1	1.00	1505	0.00	0.00
NB	LT-RT	62	1	1.00	62	0.59	0.41

CHARTER ST/COMMERCIAL ST
PM PEAK EXISTING
date: 06-27-1989 time: 07:35:42

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.067	0.985	1.000	0.885	1.000	1.000	1.000	1.000	1674
WB	TH	1800	1	1.067	0.985	1.000	0.885	1.000	1.000	1.000	1.000	1674
NB	LT-RT	1800	1	1.000	0.985	1.000	0.875	1.000	1.000	0.845	0.820	1075

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	687	1674	0.41	0.68	1141	0.60	
WB	TH	1505	1674	0.90	0.68	1141	1.32	*
NB	LT-RT	62	1075	0.06	0.04	47	1.32	*

CYCLE=102.0 LOST=28.0 SUM V/S CRIT= 0.96 TOTAL V/C= 1.32

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.60		0.68	102.0	6.66	1141	0.62	1.00	7.29	B	6.2	20
WB	TH	1.32	*	0.68	102.0	39.06	1141	116.44	1.00	155.50	F	91.3	275
NB	LT-RT	1.32	*	0.04	102.0	37.61	47	195.72	1.00	233.34	F	6.1	19

DIR	STREET	DELAY	LOS
EB	COMMERCIAL ST	7.29	B
WB	COMMERCIAL ST	155.50	F
NB	CHARTER ST	233.34	F

INTERSECTION DELAY =112.46 INTERSECTION LOS=F

THE EXISTING TIMING IS OPTIMAL

I
#3
PM
(BTD ANALYSIS)

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:06-23-1989 TIME:15:48:36
HANOVER ST/COMMERCIAL ST
[redacted]

LAST DATASETS LOADED OR SAVED
VOLUME=4PM GEOMETRICS=4PM

```
KEY:   D
       :
    A- -B
       :
       C
```

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
FROM D: STOP
PREVAILING SPEED: 30 MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

MINOR STREET LANES

APPROACH: C: HANOVER ST
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: HANOVER ST
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: COMMERCIAL	B: COMMERCIAL	C: HANOVER ST	D: HANOVER ST
LEFTS	0.00	0.00	0.00	0.00
THRUS	0.00	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00	0.00

APPROACH	A: COMMERCIAL			B: COMMERCIAL			C: HANOVER ST			D: HANOVER ST		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	15	1357	3	18	588	71	38	6	45	28	0	23
PHF	0.95			0.95			0.90			0.90		
ADJ VOLUME	16	1428	3	19	619	75	42	7	50	31	0	26
PERCENT GRADE	0.00			0.00			0.00					
PASS CAR/HR	17			21			46	7	55	34	0	28

STEP 1 RIGHT TURNS FROM	C:HANOVER ST	D:HANOVER ST
CONFLICTING FLOWS	716	347
CRITICAL GAPS	5.5	5.5
CAPACITY	478	750
CAPACITY USED	12%	4%
IMPEDANCE FACTOR	0.93	0.98
ACTUAL CAPACITY	478	750

1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:06-23-1989 TIME:15:48:36
HANOVER ST/COMMERCIAL ST

STEP 2 LEFT TURNS FROM	B:COMMERCIAL ST	A:COMMERCIAL ST
CONFLICTING FLOWS	1432	694
CRITICAL GAPS	5.5	5.5
CAPACITY	176	492
CAPACITY USED	12%	4%
IMPEDANCE FACTOR	0.93	0.98
ACTUAL CAPACITY	176	492

STEP 3 THRU MOVES FROM	C:HANOVER ST	D:HANOVER ST
CONFLICTING FLOWS	2158	2123
CRITICAL GAPS	6.5	6.5
CAPACITY	26	28
CAPACITY USED	28%	0%
IMPEDANCE FACTOR	0.79	1.00
ACTUAL CAPACITY	24	26

STEP 4 LEFT TURNS FROM	C:HANOVER ST	D:HANOVER ST
CONFLICTING FLOWS	2184	2179
CRITICAL GAPS	7.0	7.0
CAPACITY	18	18
ACTUAL CAPACITY	16	12

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM A:	17	492	474	A	7.59	0.04
LT FROM B:	21	176	155	D	23.19	0.13
ALL MOVES FROM C:	109	33	-76	F	INFINITE	INFINITE
ALL MOVES FROM D:	62	22	-41	F	INFINITE	INFINITE

I
#4
PM
(BTD ANALY

```
CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:06-23-1989              TIME:14:39:14
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~~[illegible]~~

PM PEAK EXISTING

```
LAST DATASETS LOADED OR SAVED
VOLUME=3PM        GEOMETRICS=3PM
KEY:   D
       |
    A- -B
       |
       C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
          FROM D: STOP
PREVAILING SPEED:  30  MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

MINOR STREET LANES

APPROACH: C: BATTERY ST
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: BATTERY ST
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)
APPROACH     A: COMMERCIAL  B: COMMERCIAL  C: BATTERY ST  D: BATTERY ST
LEFTS          0.00           0.00           0.00           0.00
THRUS          0.00           0.00           0.00           0.00
RIGHTS         0.00           0.00           0.00           0.00

APPROACH       A: COMMERCIAL   B: COMMERCIAL   C: BATTERY ST   D: BATTERY ST
               LT   TH   RT    LT   TH   RT    LT   TH   RT    LT   TH   RT
VOLUME         18 1363    8    11  613   25     8    4    6     6    2    9
PHF              0.95            0.95            0.90            0.90
ADJ VOLUME     19 1435    8    12  645   26     9    4    7     7    2   10
PERCENT GRADE  0.00            0.00            0.00
PASS CAR/HR    21              13              10    5    7     7    2   11

STEP 1 RIGHT TURNS FROM   C:BATTERY ST      D:BATTERY ST
CONFLICTING FLOWS              722               336
CRITICAL GAPS                  5.5               5.5
CAPACITY                       474               760
CAPACITY USED                   2%                1%
IMPEDANCE FACTOR              0.99              0.99
ACTUAL CAPACITY                474               760
```

1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:06-23-1989 TIME:14:39:14
BATTERY ST/COMMERCIAL ST

STEP 2 LEFT TURNS FROM	B:COMMERCIAL ST	A:COMMERCIAL ST
CONFLICTING FLOWS	1443	672
CRITICAL GAPS	5.5	5.5
CAPACITY	173	506
CAPACITY USED	7%	4%
IMPEDANCE FACTOR	0.96	0.98
ACTUAL CAPACITY	173	506

STEP 3 THRU MOVES FROM	C:BATTERY ST	D:BATTERY ST
CONFLICTING FLOWS	2141	2132
CRITICAL GAPS	6.5	6.5
CAPACITY	27	28
CAPACITY USED	18%	9%
IMPEDANCE FACTOR	0.88	0.95
ACTUAL CAPACITY	26	26

STEP 4 LEFT TURNS FROM	C:BATTERY ST	D:BATTERY ST
CONFLICTING FLOWS	2153	2143
CRITICAL GAPS	7.0	7.0
CAPACITY	19	20
ACTUAL CAPACITY	17	16

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM A:	21	506	485	A	7.43	0.04
LT FROM B:	13	173	160	D	22.46	0.08
ALL MOVES FROM C:	22	28	6	E	580.52	3.55
ALL MOVES FROM D:	21	37	16	E	222.56	1.28

I
#5(A)
PM
(BTD ANALYSIS)

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:06-23-1989   TIME:14:13:25
[redacted] EXISTING

LAST DATASETS LOADED OR SAVED
VOLUME=2PM   GEOMETRICS=2PM
KEY: A- -B
:
C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
PREVAILING SPEED: 30 MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: FLEET ST
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: COMMERCIAL	B: COMMERCIAL	C: FLEET ST
LEFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: COMMERCIAL			B: COMMERCIAL			C: FLEET ST		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	689	0	0	1256	0	15	0	34
PHF	0.95			0.95			0.90		
ADJ VOLUME	0	725	0	0	1322	0	17	0	38
PERCENT GRADE	0.00			0.00			0.00		
PASS CAR/HR	0			0			18	0	42

STEP 1 RIGHT TURNS FROM	C:FLEET ST
CONFLICTING FLOWS	363
CRITICAL GAPS	5.5
CAPACITY	737
ACTUAL CAPACITY	737

STEP 2 LEFT TURNS FROM	B:COMMERCIAL ST
CONFLICTING FLOWS	725
CRITICAL GAPS	5.5
CAPACITY	472
CAPACITY USED	0%
IMPEDANCE FACTOR	1.00
ACTUAL CAPACITY	472

1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:06-23-1989 TIME:14:13:25
FLEET ST/COMMERCIAL ST

STEP 3 LEFT TURNS FROM C:FLEET ST

CONFLICTING FLOWS	2047
CRITICAL GAPS	7.0
CAPACITY	25
ACTUAL CAPACITY	25

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
ALL MOVES FROM C:	60	75	15	E	236.58	3.94

I
#5(B)
PM
(BTD ANALYSIS)

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:06-23-1989 TIME:14:05:35
[redacted] EXISTING
LAST DATASETS LOADED OR SAVED
VOLUME=1PM GEOMETRICS=1PM
KEY: A- -B
:
C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
PREVAILING SPEED: 30 MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: COMMERCIAL ST
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: COMMERCIAL	B: ATLANTIC AV	C: COMMERCIAL
LEFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: COMMERCIAL			B: ATLANTIC AV			C: COMMERCIAL		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	689	0	0	1256	0	58	0	30
PHF	0.95			0.95			0.90		
ADJ VOLUME	0	725	0	0	1322	0	64	0	33
PERCENT GRADE	0.00			0.00			0.00		
PASS CAR/HR	0			0			71	0	37

STEP 1 RIGHT TURNS FROM	C:COMMERCIAL ST
CONFLICTING FLOWS	363
CRITICAL GAPS	5.5
CAPACITY	737
ACTUAL CAPACITY	737

STEP 2 LEFT TURNS FROM	B:ATLANTIC AVE
CONFLICTING FLOWS	725
CRITICAL GAPS	5.5
CAPACITY	472
CAPACITY USED	0%
IMPEDANCE FACTOR	1.00
ACTUAL CAPACITY	472

DATE:06-23-1989 TIME:14:05:35
ATLANTIC AVE/COMMERCIAL ST

STEP 3 LEFT TURNS FROM	C:COMMERCIAL ST	
CONFLICTING FLOWS		2047
CRITICAL GAPS		7.0
CAPACITY		25
ACTUAL CAPACITY		25

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
ALL MOVES FROM C:	108	37	-71	F	INFINITE	INFINITE

1
#6
PM

985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

AST DATA SET NAMES LOADED OR SAVED
OLUME=6-PM GEOMETRICS=6-PM SIGNAL=6-PM
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
[illegible]	[illegible]	0	33	46	0	1	[illegible]	0.0	10.0	0.0	10
B	113	1	33	147	0	1	0	0.0	12.0	0.0	30
B	50	974	60	1084	0	2	0	0.0	12.0	0.0	60
B	51	930	32	1013	0	2	0	0.0	12.0	0.0	60

OTAL VOLUME = 2290

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
[illegible]	0.0%	3.0%	N	3	0	.900	50	N	14.5	3
B	0.0%	3.0%	Y	5	0	.900	50	Y	14.5	3
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	0.0%	3.0%	N	[illegible]	0	.900	50	Y	22.0	3

PHASINGS

EASTBOUND	WESTBOUND	NORTHBOUND	SOUTHBOUND	GREEN	Y+R	PRE/ACT
[illegible]	[illegible]	[illegible]	[illegible]			
- - *	* * *			12.8	4	[illegible]
		* - -	* * *	59.2	[illegible]	[illegible]
*	*	*	*	0.0	20	A

YCLE=100.0 LOST=28.0 SUM V/S CRIT= 0.69 TOTAL V/C= 0.96

LEVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.33		0.13	100.0	30.16	155	0.00	0.85	25.63	D	1.2	5
WB	LT-TH-RT	0.96	*	0.13	100.0	32.94	170	44.42	0.85	65.75	F	5.9	19
NB	LT-TH-RT	0.96	*	0.59	100.0	14.67	1316	12.73	0.85	23.29	C	17.0	52
SB	LT-TH-RT	0.94		0.59	100.0	14.20	1262	10.28	0.85	20.82	C	14.8	45

DIR	Delay	LOS
EB	25.63	D
WB	65.75	F
NB	23.29	C
SB	20.82	C

INTERSECTION DELAY = 24.84 INTERSECTION LOS=C

I
#7
PM

985 HCM - CHAPTER 9: SIGNALIZED

TLANTIC AVE/[redacted]
987 [redacted]
AST DATA SET NAMES LOADED OR SAVED
OLUME=8-PM GEOMETRICS=8-PM SIGNAL=8-PM
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
B	86	0	127	213	0	2	0	0.0	12.0	0.0	30
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	0	1410	0	1410	0	2	0	0.0	12.0	0.0	60
B	0	912	0	912	0	2	0	0.0	12.0	0.0	60

OTAL VOLUME = 2535

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	.0%	3.0%	N	3	0	.900	50	Y	14.5	3
B	.0%	0.0%	N	5	0	.000	0	N	14.5	0
B	.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	.0%	3.0%	N	0	0	.900	50	Y	22.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
																	10.2	4	A
										*				*			61.8	4	A
				*				*				*				*	0.0	20	A

YCLE=100.0 LOST=28.0 SUM V/S CRIT= 0.54 TOTAL V/C= 0.75

LEVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	LT-RT	0.75	*	0.10	100.0	33.16	331	7.74	1.00	40.90	E	6.4	20
B	TH	0.75	*	0.62	100.0	10.37	2190	1.26	0.85	9.88	B	16.6	51
B	TH	0.49		0.62	100.0	7.94	2190	0.00	0.85	6.75	B	10.8	33

IR	Delay	LOS
B	40.90	E
B	9.88	B
B	6.75	B

NTERSECTION DELAY = 11.36 INTERSECTION LOS=B

I
#16
PM

WORKSHEET FOR FOUR-LEG INTERSECTIONS

Page 1

Location: [redacted] Name: ____

HOURLY VOLUMES

Grade ~~+3~~ %
ONEWAY
STOP☐
YIELD☐
V_{12} V_{11} V_{10}
N = ☒

N

N = 4

V_6 ____
V_5 ____
V_4 ____
N = ☒

Grade 0 %

647 V_1
735 V_2
310 V_3

V_2 = 1382

Combine V_1 + V_2 because V_1 is more like a through than a left

V_9 = 1179

Grade 0 %

major road ONEWAY
ATLANTIC

N = 2

STOP ☑
YIELD ☐

V_7 V_8 V_9
0 362 817

minor road
NORTHERN-FH

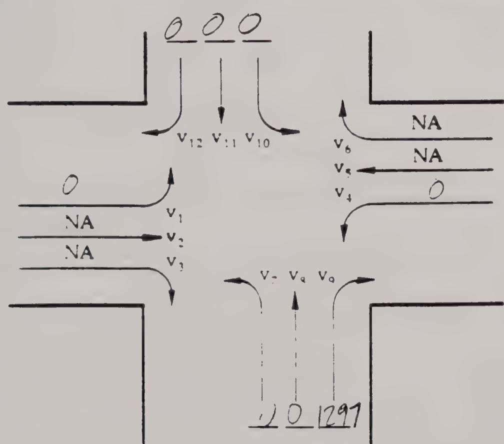
Date of counts: 1987
Time Period: PM EXISTI[redacted]
Average Running Speed: 30
PHF: ____

Grade 0 %

VOLUME ADJUSTMENTS

Movement No.	1	2	3	4	5	6	7	8	9	10	11	12
Volume (vph)	0	1382	310	0	0	0	0	0	1179	0	0	0
Vol. (pcph), see Table 10-1 (1.1)	0			0			0	0	1297	0	0	0

VOLUMES IN PCPH



WORKSHEET FOR FOUR-LEG INTERSECTIONS — Page 2

STEP 1: RT From Minor Street	V_9	V_{12}
Conflicting Flows, V_c	$1/2\ V_3 + V_2 = V_{c9}$ 155 + 1382 = 1537 vph	$1/2\ V_6 + V_5 = V_{c12}$ 0 + 0 = 0 vph
Critical Gap, T_c (Tab. 10-2)	5.5 (sec)	______ (sec)
Potential Capacity, c_p (Fig. 10-3)	c_{p9} = 160 pcph	c_{p12} = ______ pcph
Percent of c_p Utilized	$(v_9/c_{p9}) \times 100$ = ______ %	$(v_{12}/c_{p12}) \times 100$ = ______ %
Impedance Factor, P (Fig. 10-5)	P_9 = ______	P_{12} = ______
Actual Capacity, c_m	$c_{m9} = c_{p9}$ = 160 pcph	$c_{m12} = c_{p12}$ = ______ pcph
STEP 2: LT From Major Street	V_4	V_1
Conflicting Flows, V_c	$V_3 + V_2 = V_{c4}$ 310 + 1382 = 1692 vph	$V_6 + V_5 = V_{c1}$ 0 + 0 = 0 vph
Critical Gap, T_c (Tab. 10-2)	______ (sec)	______ (sec)
Potential Capacity, c_p (Fig. 10-3)	c_{p4} = ______ pcph	c_{p1} = ______ pcph
Percent of c_p Utilized	$(v_4/c_{p4}) \times 100$ = ______ %	$(v_1/c_{p1}) \times 100$ = ______ %
Impedance Factor, P (Fig. 10-5)	P_4 = ______	P_1 = ______
Actual Capacity, c_m	$c_{m4} = c_{p4}$ = ______ pcph	$c_{m1} = c_{p1}$ = ______ pcph
STEP 3: TH From Minor Street	V_8	V_{11}
Conflicting Flows, V_c	$1/2V_3+V_2+V_1+V_6+V_5+V_4=V_{c8}$ 155 + 1382 + 0 + 0 + 0 + 0 = 1537 vph	$1/2V_6+V_5+V_4+V_3+V_2+V_1=V_{c11}$ 0 + 0 + 0 + 310 + 1382 + 0 = 1692 vph
Critical Gap, T_c (Tab. 10-2)	______ (sec)	______ (sec)
Potential Capacity, c_p (Fig. 10-3)	c_{p8} = ______ pcph	c_{p11} = ______ pcph
Percent of c_p Utilized	$(v_8/c_{p8}) \times 100$ = ______ %	$(v_{11}/c_{p11}) \times 100$ = ______ %
Impedance Factor, P (Fig. 10-5)	P_8 = ______	P_{11} = ______
Actual Capacity, c_m	$c_{m8} = c_{p8} \times P_1 \times P_4$ ______ = ______ × ______ × ______ (pcph)	$c_{m11} = c_{p11} \times P_1 \times P_4$ ______ = ______ × ______ × ______ (pcph)
STEP 4: LT From Minor Street	V_7	V_{10}
Conflicting Flows, V_c	V_{c8} (step 3) + V_{11} + V_{12} = V_{c7} 1537 + 0 + 0 = 1537 vph	V_{c11} (step 3) + V_4 + V_3 = V_{c10} 1692 + 0 + 297 = 2989 vph
Critical Gap, T_c (Tab. 10-2)	______ (sec)	______ (sec)
Potential Capacity, c_p (Fig. 10-3)	c_{p7} = ______ pcph	c_{p10} = ______ pcph
Actual Capacity, c_m	$c_{m7} = c_{p7} \times P_1 \times P_4 \times P_{11} \times P_{12}$ ______ = ______ × ______ × ______ × ______ × ______ (pcph)	$c_{m10} = c_{p10} \times P_1 \times P_4 \times P_8 \times P_9$ ______ = ______ × ______ × ______ × ______ × ______ (pcph)

WORKSHEET FOR FOUR-LEG INTERSECTIONS

Page 3

SHARED-LANE CAPACITY

$$c_{SH} = \frac{v_i + v_j}{(v_i/c_{mi}) + (v_j/c_{mj})}$$ where 2 movements share a lane

$$c_{SH} = \frac{v_i + v_j + v_k}{(v_i/c_{mi}) + (v_j/c_{mj}) + (v_k/c_{mk})}$$ where 3 movements share a lane

MINOR STREET APPROACH MOVEMENTS 7, 8, 9

ind diagram page 2 above

Table 10-3

Movement	v(pcph)	c_m(pcph)	c_{SH}(pcph)	$c_R = c_{SH} - v$	[illegible]
7					
8					
9	1297	160	—	-1137	F

MINOR STREET APPROACH MOVEMENTS 10, 11, 12

Movement	v(pcph)	c_m(pcph)	c_{SH}(pcph)	$c_R = c_{SH} - v$	LOS
10					
11					
12					

MAJOR STREET LEFT TURNS 1, 4

Movement	v (pcph)	c_m (pcph)	$c_R = c_m - v$	LOS
1			–	
4				

COMMENTS:

This analysis may not really represent what is happening. The right turns [illegible] do have difficulty getting out, but there are breaks in Atlantic Ave traffic due to [illegible] Also, there [illegible] signal.

1201[illegible] AP

II
#1
AM

1985 HCM: CHAPTER 9: SIGNALIZED
1: COMMERCIAL ST./N.WASHINGTON ST./CAUSEWAY ST.
2000 BBS SCENARIO [illegible] AM PEAK
-ST DATA SET NAMES LOADED OR SAVED
-LUME=1AM-115 GEOMETRICS=1AM-115 SIGNAL=1AM-115
-OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
		H	RT	TOTAL	LT	TH	RT	LT	TH	R	WALK
B	210	142	15	367	2	1	0	12.0	12.0	0.0	60
B	304	385	321	1010	0	2	1	0.0	12.0	12.0	60
B	184	252	143	579	0	2	1	0.0	12.0	12.0	60
B	648	546	520	1714	2	1	1	12.0	12.0	12.0	60

-TAL VOLUME = 3670

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
R	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
B	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
	0.0%	3.0%	N	3	0	.950	0		22.0	3
	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PED/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
														*	*		19.3	0	A
							*						*	*	*		19.3	4	A
							*		*	*	*			*	*		43.8	4	A
	*	*	*				*								*		12.5	4	A
		*	*		*	*	*										39.0	4	A

-CLE=150.0 LOST=16.0 SUM V/S CRIT= 0.76 TOTAL V/C= 0.85

LEVEL OF SERVICE WORKSHEET

R	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
	LT	0.85	*	0.08	150.0	51.55	272	17.90	1.00	69.45	F	9.8	30
	TH-RT	0.26		0.37	150.0	24.97	647	0.00	0.85	21.23	C	4.3	14
	LT-TH	0.85	*	0.26	150.0	40.10	894	6.53	0.85	39.63	D	22.4	68
	RT	0.27		0.64	150.0	1.78	1273	0.00	0.85	1.51	A	2.2	7
	LT-TH	0.85	*	0.29	150.0	38.02	866	9.79	0.85	40.64	E	13.5	42
	RT	0.34		0.29	150.0	31.72	440	0.00	0.85	26.96	D	4.4	14
	LT	0.85	*	0.26	150.0	40.25	941	6.90	1.00	47.15	E	22.2	67
	TH	0.56		0.58	150.0	15.12	1022	0.38	0.85	13.19	B	10.1	31
	RT	0.53		0.69	150.0	8.79	1035	0.16	0.85	7.61	B	7.1	22

elay LOS
[illegible]
[illegible] D
-ED ON DELAY = [illegible] INTERSECTION LOS=D

II
#2
AM

AMS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-16-1989
14:58:34
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: MW

1985 HCM — CHAPTER 9: SIGNALIZED

#2 [redacted]
2000 BRA SCENARIO II — AM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=2AM-II GEOMETRICS=2AM-II SIGNAL=2AM-II
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	0	703	0	703	0	2	0	0.0	11.0	0.0	60
WB	0	777	0	777	0	2	0	0.0	11.0	0.0	60
NB	257	0	43	300	0	1	0	0.0	12.0	0.0	30
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 1780

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
WB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
NB	0.0%	3.0%	Y	[illegible]	[illegible]	.950	0	Y	14.5	[illegible]
SB	0.0%	0.0%	N	0	0	.000	0	[illegible]	14.5	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	[illegible]	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1		*				*											34.[illegible]		[illegible]
2				*				*				*				*	0.0	20	[illegible]
3									*		*						40.0	4	A

CYCLE=102.0 LOST=28.0 SUM V/S CRIT= 0.55 TOTAL V/C= 0.75

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.68		0.33	102.0	22.28	1143	1.35	0.85	[illegible]	[illegible]	14.0	43
WB	TH	0.75	*	0.33	102.0	22.99	1143	2.39	0.85	21.57	[illegible]	15.5	47
NB	LT-RT	0.75	*	0.29	102.0	20.30	420	6.22	1.00	26.52	D	5.7	18

DIR	Delay	LOS
EB	[illegible]	[illegible]
WB	21.57	[illegible]
NB	26.52	D

INTERSECTION DELAY = 21.78 INTERSECTION LOS=C

PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5135-02 BY: MW

1985 HCM — CHAPTER 9: SIGNALIZED

COMMERCIAL ST./HANOVER ST.
2000 BRA SCENARIO II - AM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=3AM-II GEOMETRICS=3AM-II SIGNAL=3AM-II
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	127	1	76	204	0	1	0	0.0	12.0	0.0	30
WB	9	1	7	17	0	1	0	0.0	12.0	0.0	30
NB	31	657	13	701	0	2	0	0.0	11.0	0.0	60
SB	18	566	128	712	0	2	0	0.0	11.0	0.0	60

TOTAL VOLUME = 1634

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	3	0	.950	0	Y	14.5	3
WB	0.0%	3.0%	N	3	0	.950	0	Y	14.5	3
NB	0.0%	3.0%	N	5	0	.950	0	Y	22.0	3
SB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*								[illegible]		[illegible]
2									*	*	*		*	*	*		52.7	4	A
3				*				*				*				*	0.0	10	A
4	*	*	*		*	*	*										31.3	4	A

CYCLE=102.0 LOST=18.0 SUM V/S CRIT= 0.40 TOTAL V/C= 0.49

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.49	*	0.31	102.0	21.90	438	0.00	0.85	18.62	[illegible]	4.2	14
WB	LT-TH-RT	0.04		0.31	102.0	18.86	402	0.00	0.85	16.03	C	0.4	2
NB	LT-TH-RT	0.46		0.52	102.0	11.86	1700	0.00	0.85	10.08	B	10.1	31
SB	LT-TH-RT	0.49	*	0.52	102.0	12.15	1604	0.00	0.85	10.32	B	10.3	32

DIR	Delay	LOS
EB	18.62	[illegible]
WB	16.03	[illegible]
NB	[illegible]	[illegible]
SB	[illegible]	[illegible]

INTERSECTION DELAY = [illegible].27 INTERSECTION LOS=B

1995
4 AM
(BTD ANALYSIS)

COMMERCIAL STREET/BATTERY STREET
1995 AM-PEAK — DESIGN YEAR
Date: 08-15-1989 Time: 17:33:02

1985 HCM - CHAPTER 9: SIGNALIZED CINCH VERSION 2.0
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=5PM GEOMETRICS=5PM SIGNAL=5PM

LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	STREET	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	BATTERY STREET	10	3	10	23	0	1	0	0.0	12.0	0.0	30
WB	BATTERY STREET	118	3	79	200	0	1	0	0.0	12.0	0.0	30
NB	COMMERCIAL STREET	56	649	11	716	0	2	0	0.0	11.0	0.0	60
SB	COMMERCIAL STREET	12	965	7	984	0	2	0	0.0	11.0	0.0	60

TOTAL VOLUME = 1923

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	3.0%	N	5	0	.950	0	Y	14.5	3
WB	0.0%	3.0%	N	5	0	.950	0	Y	14.5	3
NB	0.0%	3.0%	N	5	0	.950	0	Y	22.0	3
SB	0.0%	3.0%	N	5	0	.950	0	Y	22.0	3

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1									*	*	*						2.0	0	A
2									*	*	*		*	*	*		52.0	4	A
3				*				*				*				*	0.0	18	A
4	*	*	*		*	*	*										22.0	4	A

CYCLE= 102.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	10	3	10	.950	11	3	11
WB	118	3	79	.950	124	3	83
NB	56	649	11	.950	59	683	12
SB	12	965	7	.950	13	1016	7

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	24	1	1.00	24	0.43	0.43
WB	LT-TH-RT	211	1	1.00	211	0.59	0.40
NB	LT-TH-RT	754	2	1.05	791	0.08	0.02
SB	LT-TH-RT	1036	2	1.05	1088	0.01	0.01

COMMERCIAL STREET/BATTERY STREET
1995 AM PEAK - DESIGN YEAR

date: 08-15-1989 time: 19:35:04

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.841	0.893	1332
WB	LT-TH-RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.847	0.984	1478
NB	LT-TH-RT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	0.998	0.872	2982
SB	LT-TH-RT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	0.999	0.965	3306

SUPPLEMENTAL WORKSHEET FOR
LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto	LGo
EB	102	22	1	24	14	11	0.43	1	86	0.59	0
WB	102	22	1	211	86	124	0.59	1	14	0.43	0
SB	102	52	2	1036	1036	13	0.01	2	754	0.08	2

CALCULATIONS

DIR	Sop	Yo	Gm	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1531	0.056	17.219	0.821	0.435	4.781	0.565	1.935	1.370	0.893	0.893
WB	1550	0.009	21.288	0.866	0.590	0.712	0.410	0.378	1.298	0.984	0.984
SB	2752	0.274	35.893	0.404	0.046	16.107	0.954	13.117	2.785	0.931	0.965

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	24	1332	0.02	0.22	287	0.08	
WB	LT-TH-RT	211	1478	0.14	0.22	319	0.66	*
NB	LT-TH-RT	791	2982	0.27	0.53	1579	0.50	
SB	LT-TH-RT	1088	3306	0.33	0.51	1686	0.65	*

CYCLE=102.0 LOST=26.0 SUM V/S CRIT= 0.47 TOTAL V/C= 0.63

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.08		0.22	102.0	24.28	287	0.00	0.85	20.64	C	0.5	2
WB	LT-TH-RT	0.66	*	0.22	102.0	27.80	319	3.96	0.85	27.00	D	4.7	15
NB	LT-TH-RT	0.50		0.53	102.0	11.68	1579	0.00	0.85	9.94	B	10.0	31
SB	LT-TH-RT	0.65	*	0.51	102.0	13.88	1686	0.67	0.85	12.37	B	14.4	44

DIR	STREET	DELAY	LOS
EB	BATTERY STREET	20.64	C
WB	BATTERY STREET	27.00	D
NB	COMMERCIAL STREET	9.94	B
SB	COMMERCIAL STREET	12.37	B

INTERSECTION DELAY = 13.01 INTERSECTION LOS=B

1995
#5 AM
(BTD ANALYSIS)

ATLANTIC AVE/COMMERCIAL ST/FLEET ST/EASTERN AVE
1995 AM PEAK
Date: 10-02-1989 Time: 14:50:36

1985 HCM - CHAPTER 9: SIGNALIZED CINCH VERSION 2.0
LAST DATA SET NAMES LOADED OR SAVED
VOLUME= GEOMETRICS= SIGNAL=

LOCATED IN CBD:N

VOLUME & GEOMETRICS

		VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	STREET	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	COMMERCIAL STREET	60	0	24	84	0	1	0	0.0	12.0	0.0	28
WB	EASTERN AVENUE	68	0	46	114	0	1	0	0.0	12.0	0.0	28
NB	ATLANTIC AVENUE	0	692	88	780	0	2	0	0.0	12.0	0.0	60
SB	COMMERCIAL STREET	59	1061	0	1120	0	2	0	0.0	12.0	0.0	60

TOTAL VOLUME = 2098

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	Y	5	0	.850	0	Y	14.0	3
WB	0.0%	3.0%	N	0	0	.850	0	Y	14.0	3
NB	0.0%	3.0%	Y	5	0	.950	0	Y	22.0	3
SB	0.0%	3.0%	Y	5	0	.950	0	Y	22.0	3

SIGNAL PHASING

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*		*														8.7	4	A
2					*		*										10.3	4	A
3																	0.0	8	A
4									*	*	*		*	*	*		41.0	4	A

CYCLE= 80.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	60	0	24	.850	71	0	28
WB	68	0	46	.850	80	0	54
NB	0	692	88	.950	0	728	93
SB	59	1061	0	.950	62	1117	0

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	99	1	1.00	99	0.71	0.29
WB	LT-RT	134	1	1.00	134	0.60	0.40
NB	TH-RT	821	2	1.05	862	0.00	0.11
SB	LT-TH	1179	2	1.05	1238	0.05	0.00

ATLANTIC AVE/COMMERCIAL ST/FLEET ST/EASTERN AVE
1995 AM PEAK

date: 10-02-1989 time: 14:50:38

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.000	0.985	1.000	0.875	1.000	1.000	0.861	0.804	1074
WB	LT-RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.846	0.819	1229
NB	TH-RT	1800	2	1.000	0.985	1.000	0.937	1.000	1.000	0.983	1.000	3268
SB	LT-TH	1800	2	1.000	0.985	1.000	0.937	1.000	1.000	1.000	0.856	2845

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto	LGo
SB	80	41	2	1179	1179	62	0.05	2	821	0.00	0

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	3600	0.228	29.527	0.362	0.195	11.511	0.805	5.886	3.109	0.711	0.856

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	99	1074	0.09	0.11	116	0.85	*
WB	LT-RT	134	1229	0.11	0.13	158	0.85	*
NB	TH-RT	862	3268	0.26	0.51	1676	0.51	
SB	LT-TH	1238	2845	0.44	0.51	1459	0.85	*

CYCLE= 80.0 LOST=20.0 SUM V/S CRIT= 0.64 TOTAL V/C= 0.85

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.85	*	0.11	80.0	26.61	116	33.47	1.00	60.08	F	3.1	10
WB	LT-RT	0.85	*	0.13	80.0	25.91	158	26.75	1.00	52.67	E	3.8	12
NB	TH-RT	0.51		0.51	80.0	9.79	1676	0.05	0.85	8.37	B	8.9	28
SB	LT-TH	0.85	*	0.51	80.0	12.77	1459	4.04	0.85	14.29	B	12.8	39

DIR	STREET	DELAY	LOS
EB	COMMERCIAL STREET	60.08	F
WB	EASTERN AVENUE	52.67	E
NB	ATLANTIC AVENUE	8.37	B
SB	COMMERCIAL STREET	14.29	B

INTERSECTION DELAY = 16.25 INTERSECTION LOS=C

II
#6
AM

985 HCM - CHAPTER 9: SIGNALIZED

[redacted]

AST DATA SET NAMES LOADED OR SAVED
LUME=6AM-II   GEOMETRICS=6AM-II   SIGNAL=6AM-II
CATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
R	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
	31	0	39	70	0	1	0	0.0	10.0	0.0	10
	79	1	53	133	0	1	0	0.0	12.0	0.0	30
	14	254	53	321	0	2	0	0.0	12.0	0.0	60
	132	782	25	939	0	2	0	0.0	12.0	0.0	60

TAL VOLUME = 1463

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
R	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
	0.0%	3.0%	N	3	0	.900	50	N	14.5	3
	0.0%	3.0%	Y	5	0	.900	50	Y	14.5	3
	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3

HASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
*	*	*		*	*	*										18.6	4	A
								*	*	*		*	*	*		53.4	4	A
			*				*				*				*	0.0	20	A

CLE=100.0 LOST=28.0 SUM V/S CRIT= 0.46 TOTAL V/C= 0.64

EVEL OF SERVICE WORKSHEET

R	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
	LT-RT	0.38		0.19	100.0	27.08	206	0.00	0.85	23.02	C	1.8	6
	LT-TH-RT	0.64	*	0.19	100.0	28.60	230	4.66	0.85	28.27	D	3.3	11
	LT-TH-RT	0.28		0.53	100.0	9.70	1342	0.00	0.85	8.24	B	4.6	15
	LT-TH-RT	0.64	*	0.53	100.0	12.57	1703	0.65	0.85	11.23	B	13.5	41

R	Delay	LOS
	23.02	C
	28.27	D
	8.24	B
	11.23	B

TERSECTION DELAY = 12.60 INTERSECTION LOS=B

II
#7
AM

985 [redacted] CHAPTER 9: SIGNALIZED

[redacted] AM PEAK
ST DATA SET NAMES LOADED OR SAVED
LUME=8AM-II   GEOMETRICS=8AM-II   SIGNAL=8AM-II
CATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
R	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
	0	0	0	0	0	0	0	0.0	0.0	0.0	0
	0	0	0	0	0	0	0	0.0	0.0	0.0	0
	238	239	0	477	1	2	0	12.0	12.0	0.0	60
	0	0	858	858	0	0	2	0.0	0.0	12.0	60

TAL VOLUME = 1335

RAFFIC & ROADWAY CONDITIONS

		ADJ PARK			PEDESTRIANS				ARR
R GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
0.0%	0.0%	N	3	0	.000	0	N	7.0	0
0.0%	0.0%	N	5	0	.000	0	N	7.0	0
0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
0.0%	3.0%	N	0	0	.900	50	Y	22.0	3

HASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
								*	*							21.2	4	A
														*		50.8	4	A
			*				*				*				*	0.0	20	A

CLE=100.0 LOST=28.0 SUM V/S CRIT= 0.53 TOTAL V/C= 0.74

EVEL OF SERVICE WORKSHEET

R LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
LT	0.74	*	0.21	100.0	27.99	357	6.69	1.00	34.69	D	6.2	20
TH	0.37		0.21	100.0	25.61	752	0.00	0.85	21.77	C	5.8	18
RT	0.74	*	0.51	100.0	14.74	1352	1.86	0.85	14.11	B	13.0	40

R Delay	LOS
28.06	D
14.11	B

ERSECTION DELAY = 19.02 INTERSECTION LOS=C

II
#8
AM

PROJECT NAME: Harborpark IPOD   PROJECT NUMBER: 5136-02   BY: AP

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=9AM-II2   GEOMETRICS=9AM-II2   SIGNAL=9AM-II2
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	53	151	0	204	1	1	0	12.0	12.0	0.0	30
WB	0	61	27	88	0	1	0	0.0	12.0	0.0	60
NB	304	498	0	802	0	3	0	0.0	12.0	0.0	60
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 1094

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
WB	0.0%	3.0%	N	5	0	.900	50	Y	22.0	1
NB	0.0%	3.0%	Y	5	0	.900	50	Y	22.0	3
SB	0.0%	0.0%	N	0	0	.000	0	N	22.0	[illegible]

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*	*						15.0	4	A
2	*	*															10.0	4	A
3						*	*										13.0	4	A
4				*				*				*				*	0.0	10	A

CYCLE= 60.0 LOST=22.0 SUM V/S CRIT= 0.35 TOTAL V/C= 0.55

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.21		0.17	60.0	16.41	231	0.00	1.00	16.41	C	0.8	3
EB	TH	0.57	*	0.17	60.0	17.49	296	1.45	0.85	16.10	C	2.3	8
WB	TH-RT	0.30	*	0.22	60.0	14.95	330	0.00	1.54	23.02	C	1.5	5
NB	LT-TH	0.77	*	0.25	60.0	15.88	1274	2.46	0.85	15.58	C	11.1	34

DIR	Delay	LOS
EB	16.18	C
WB	23.02	C
NB	15.58	C

INTERSECTION DELAY = 16.25 INTERSECTION LOS=C

II-
#9
AM

985 HCM - CHAPTER 9: SIGNALIZED

[redacted] NAMES LOADED OR SAVED
DLUME=18-AMSC2 GEOMETRICS=18-AMSC2 SIGNAL=18-AMSC2
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	58	308	0	366	1	1	0	12.0	12.0	0.0	48
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	204	1519	1018	2741	0	3	0	0.0	12.0	0.0	36

OTAL VOLUME = 3107

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	0.0%	0.0%	N	5	0	.000	0	N	15.0	0
B	0.0%	3.0%	N	0	0	.900	50	Y	15.0	3
B	0.0%	0.0%	N	5	0	.000	0	Y	12.0	0
B	0.0%	3.0%	N	5	0	.900	50	Y	12.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
													*	*	*		40.4	4	A
					*	*										*	11.6	4	A

YCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.87 TOTAL V/C= 1.00

EVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	LT	0.20		0.19	60.0	15.46	324	0.00	1.00	15.46	C	0.9	[illegible]
B	TH	1.00	*	0.19	60.0	18.42	341	37.91	0.85	47.88	E	8.2	26
B	LT-TH-RT	1.00	*	0.67	60.0	7.46	3343	12.38	0.85	16.87	C	26.8	81

IR	Delay	LOS
B	42.74	E
B	16.87	C

NTERSECTION DELAY = 19.67 INTERSECTION LOS=C

II
#10
AM

```
MS Consultants inc.    USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC.
OJECT NAME: Harborpark IPOD  PROJECT NUMBER: 5136-02  BY: AP                         11-22-1989 12:1
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1985 HCM - CHAPTER 9: SIGNALIZED
[redacted]
AST DATA SET NAMES LOADED OR SAVED
OLUME=10AM-II     GEOMETRICS=10AM-II     SIGNAL=10AM-II
OCATED IN CBD:N
VOLUME & GEOMETRICS
          VOLUMES            # OF LANES     LANE WIDTH        CROSS
IR  LT    TH    RT   TOTAL   LT  TH  RT     LT    TH    RT    WALK
B  177   322     0    499     2   1   0   12.0  12.0   0.0     30
     0     0   126    126     0   0   2    0.0   0.0  12.0     60
B    0   653    21    674     0   2   1    0.0  12.0  12.0     60
B    0     0     0      0     0   0   0    0.0   0.0   0.0      0

OTAL VOLUME =   1299

RAFFIC & ROADWAY CONDITIONS
                ADJ PARK                PEDESTRIANS             ARR
IR GRADE  %HV   Y/N MOVES BUSES  PHF  CROSS BUT MIN TIME      TYPE
B  0.0%   3.0%   N     3     0   .900   50   Y     22.0         3
B  0.0%   3.0%   N     5     0   .900   50   Y     22.0         3
B  0.0%   3.0%   N     5     0   .900   50   Y     22.0         3
B  0.0%   0.0%   N     0     0   .000    0   N     22.0         0

HASINGS
  EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND  GREEN   Y+R  PRE/ACT
  l  t  r  p   l  t  r  p   l  t  r  p   l  t  r  p
     *                                               20.5    4     A
                                  *  *               21.9    4     A
                       *                              5.6    4     A

CLE= 60.0   LOST=12.0   SUM V/S CRIT= 0.47  TOTAL V/C= 0.59

EVEL OF SERVICE WORKSHEET
IR LN GROUP   v/c  CM g/C     C     d1     c      d2   PF    Delay LOS Avg Q  95% Q
   LT         0.18    0.34  60.0  10.54  1116   0.00 1.00   10.54  B    2.2    7
   TH         0.59 *  0.34  60.0  12.36   607   0.99 0.85   11.35  B    3.9   13
   RT         0.59 *  0.09  60.0  19.82   249   2.39 0.85   18.88  C    2.1    7
   TH         0.59 *  0.36  60.0  11.74  1292   0.47 0.85   10.37  B    7.7   24
   RT         0.04    0.36  60.0   9.36   549   0.00 0.85    7.96  B    0.2    1

IR Delay LOS
   11.05  B
   18.88  C
   10.30  B
TERSECTION DELAY = 11.43 INTERSECTION LOS=B
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MS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-22-1989 11:
OJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

AST DATA SET NAMES LOADED OR SAVED
OLUME=19-amsc2 GEOMETRICS=19-AMSC2 SIGNAL=19-AMSC2
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
B	0	222	11	233	0	3	0	0.0	12.0	0.0	36
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	277	1205	0	1482	0	3	0	0.0	12.0	0.0	36

OTAL VOLUME = 1715

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	0.0%	3.0%	N	5	0	.900	50	Y	12.0	1
B	0.0%	0.0%	N	0	0	.900	0	Y	12.0	0
B	0.0%	0.0%	N	5	0	.000	0	Y	12.0	0
B	0.0%	3.0%	N	5	0	.900	50	Y	12.0	3

PHASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
			*									*	*			29.0	4	A
	*	*													*	23.0	4	A

YCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.39 TOTAL V/C= 0.46

LEVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	TH-RT	0.14	*	0.38	60.0	9.16	2025	0.00	1.54	14.11	B	2.7	9
B	LT-TH	0.70	*	0.48	60.0	9.23	2571	0.74	0.85	8.47	B	14.2	43

IR	Delay	LOS
B	14.11	B
B	8.47	B

NTERSECTION DELAY = 9.24 INTERSECTION LOS=B

II
#12
AM

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=11AM-II   GEOMETRICS=11AM-II   SIGNAL=11AM-II
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	77	13	0	90	1	1	0	12.0	12.0	0.0	60
WB	0	118	0	118	0	1	0	0.0	12.0	0.0	60
NB	301	602	226	1129	0	3	0	0.0	12.0	0.0	60
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 1337

TRAFFIC & ROADWAY CONDITIONS

			ADJ	PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
WB	0.0%	3.0%	N	5	0	.900	50	Y	22.0	2
NB	0.0%	3.0%	Y	5	0	.900	50	Y	22.0	2
SB	0.0%	0.0%	N	0	0	.000	0	N	22.0	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*															6.0	4	A
2									*	*	*						33.2	4	A
3						*	*						*				8.8	4	A

CYCLE= 60.0 LOST=12.0 SUM V/S CRIT= 0.40 TOTAL V/C= 0.50

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.50	*	0.10	60.0	19.43	170	0.16	1.00	19.59	C	1.3	5
EB	TH	0.08		0.10	60.0	18.59	178	0.00	0.85	15.81	C	0.2	1
WB	TH	0.50	*	0.15	60.0	17.94	260	0.10	1.08	19.48	C	1.9	6
NB	LT-TH-RT	0.50	*	0.55	60.0	6.32	2734	0.01	1.08	6.84	B	9.3	29

DIR	Delay	LOS
EB	19.04	C
WB	19.48	C
NB	6.84	B

INTERSECTION DELAY = 8.62 INTERSECTION LOS=B

II
#13
AM

AMS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-19-1989
16:24:41
PROJECT NAME: Harborpark IPDD PROJECT NUMBER: 5136-02 BY: AP

1985 HCM - CHAPTER 9: SIGNALIZED

[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=20-AMSC2 GEOMETRICS=20-AMSC2 SIGNAL=20-AMSC2
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	0	34	0	34	0	1	0	0.0	15.0	0.0	20
WB	184	235	0	419	1	1	0	12.0	12.0	0.0	36
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	57	1233	71	1361	0	3	0	0.0	12.0	0.0	36

TOTAL VOLUME = 1814

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
WB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
NB	0.0%	0.0%	N	0	0	.000	50	Y	12.0	0
SB	0.0%	3.0%	N	5	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1		*			*	*										*	16.5	4	A
2								*					*	*	*		35.5	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.46 TOTAL V/C= 0.54

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.07		0.27	60.0	12.23	536	0.00	0.85	10.40	B	0.5	2
WB	LT	0.44		0.27	60.0	13.64	466	0.00	0.85	11.59	B	2.5	8
WB	TH	0.54	*	0.27	60.0	14.07	487	0.44	0.85	12.33	B	3.2	10
SB	LT-TH-RT	0.54	*	0.59	60.0	5.56	3102	0.07	0.85	4.78	A	10.3	32

DIR	Delay	LOS
EB	10.40	B
WB	12.01	B
SB	4.78	A

INTERSECTION DELAY = 6.43 INTERSECTION LOS=B

II
#14
AM

PROJECT NAME: Harborpark IPOD   PROJECT NUMBER: 5136-02   BY: AP

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=13-AMSC2   GEOMETRICS=13-AMSC2   SIGNAL=13-AMSC2
LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
WB	41	341	0	382	0	2	0	0.0	12.0	0.0	36
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	0	927	288	1215	0	2	1	0.0	12.0	12.0	36

TOTAL VOLUME = 1597

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	0.0%		0	0	.000	0	Y	12.0	0
WB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
NB	0.0%	0.0%	N	0	0	.000	0	Y	12.0	0
SB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1								*						*	*		36.8	4	A
2					*	*										*	15.2	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.43 TOTAL V/C= 0.50

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
WB	LT-TH	0.50	*	0.25	60.0	14.55	897	0.00	0.85	12.37	B	5.3	17
SB	TH	0.50	*	0.61	60.0	4.89	2177	0.00	0.85	4.16	A	[illegible]	[illegible]
SB	RT	0.35		0.61	60.0	4.32	925	0.00	0.85	3.67	A	2.1	7

DIR	Delay	LOS
WB	12.37	B
SB	4.05	A

INTERSECTION DELAY = 6.06 INTERSECTION LOS=B

I
#16
AM

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=14-AMSC2   GEOMETRICS=14-AMSC2   SIGNAL=14-AMSC2
LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	412	514	0	926	1	2	0	12.0	12.0	0.0	36
WB	0	0	1290	1290	0	0	3	0.0	0.0	12.0	60
NB	0	736	64	800	0	4	0	0.0	12.0	0.0	48
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 3016

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3
WB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3
NB	0.0%	3.0%	N	0	0	.900	50	Y	15.0	3
SB	0.0%	0.0%	N	5	0	.000	50	Y	15.0	0

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1				*															
2										*	*						12.0	4	A
3	*	*					*					*					32.5	4	A
																	23.5	4	A

CYCLE= 80.0 LOST=12.0 SUM V/S CRIT= 0.81 TOTAL V/C= 0.95

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.93	*	0.29	80.0	20.82	495	18.50	1.00	39.32	D	10.1	31
EB	TH	0.58		0.29	80.0	18.25	1042	0.47	0.85	15.91	C	9.0	28
WB	RT	0.97	*	0.41	80.0	17.72	1621	12.64	0.85	25.80	D	22.8	69
NB	TH-RT	0.93	*	0.15	80.0	25.53	1051	11.10	0.85	31.13	D	18.4	56

DIR	Delay	LOS
EB	26.05	D
WB	25.80	D
NB	31.13	D

INTERSECTION DELAY = 27.32 INTERSECTION LOS=D

#1
PM

TAMS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-16-1989
12:50:15
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: MW

1985 HCM - CHAPTER 9: SIGNALIZED

#1 COMMERCIAL ST./N. WASHINGTON ST./CAUSEWAY ST.
2000 BRA SCENARIO II - PM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=1PM-II5 GEOMETRICS=1PM-II5 SIGNAL=1PM-II5
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	390	209	2	601	2	1	0	12.0	12.0	0.0	60
WB	517	369	466	1352	0	2	1	0.0	12.0	12.0	60
NB	66	587	105	758	0	2	1	0.0	12.0	12.0	60
SB	564	189	493	1246	2	1	1	12.0	12.0	12.0	60

TOTAL VOLUME = 3957

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
WB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
NB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
SB	0.0%	3.0%	N	0	0	.950	0	Y	22.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1													*	*	*		15.8	0	A
2							*						*	*	*		15.8	4	A
3							*		*	*	*			*	*		33.7	4	A
4	*	*	*				*								*		21.9	4	A
5		*	*		*	*	*										46.9	4	A

CYCLE=150.0 LOST=16.0 SUM V/S CRIT= 0.81 TOTAL V/C= 0.91

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.91	*	0.15	150.0	47.93	475	16.73	1.00	64.66	F	16.9	52
EB	TH-RT	0.26		0.48	150.0	17.29	859	0.00	0.85	14.70	B	4.8	15
WB	LT-TH	0.91	*	0.31	150.0	37.59	1080	8.78	0.85	39.41	D	26.7	81
WB	RT	0.37		0.87	150.0	1.47	1308	0.00	0.85	1.25	A	2.7	9
NB	LT-TH	0.91	*	0.22	150.0	43.05	796	11.25	0.85	46.15	E	22.6	69
NB	RT	0.33		0.22	150.0	37.00	338	0.00	0.85	31.45	D	3.6	12
SB	LT	0.91	*	0.21	150.0	43.90	687	12.62	1.00	56.52	E	21.9	67
SB	TH	0.24		0.46	150.0	18.60	819	0.00	0.85	15.81	C	4.5	14
SB	RT	0.54		0.63	150.0	11.64	956	0.27	0.85	10.12	B	7.9	25

DIR	Delay	LOS
EB	47.67	E
WB	16.66	[illegible]
NB	44.20	E
SB	32.53	[illegible]

INTERSECTION DELAY = 35.09 INTERSECTION LOS=D

#2
PM

PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: MW

1985 HCM - CHAPTER 9: SIGNALIZED

[redacted]/CHARTER ST.
[redacted]
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=2PM-II   GEOMETRICS=2PM-II   SIGNAL=2PM-II
LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	0	536	0	536	0	2	0	0.0	11.0	0.0	60
WB	0	1066	0	1066	0	2	0	0.0	11.0	0.0	60
NB	349	0	34	383	0	1	0	0.0	12.0	0.0	30
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 1985

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
WB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
NB	0.0%	3.0%	Y	5	0	.950	0	Y	14.5	3
SB	0.0%	0.0%	N	0	0	.000	0		14.5	0

PHASINGS

```
    EASTBOUND    WESTBOUND    NORTHBOUND   SOUTHBOUND  GREEN  Y+R  PRE/ACT
    l  t  r  p   l  t  r  p   l  t  r  p   l  c  r  p
1      *            *  *
2            *
3                        *           *             *   35.3    4    A
                                                        0.0   20    A
                            *     *                    38.7    4    A
```

CYCLE=102.0 LOST=28.0 SUM V/S CRIT= 0.72 TOTAL V/C= 0.99

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.50		0.35	102.0	20.04	1187	0.00	0.85	17.03	C	10.5	32
WB	TH	0.99	*	0.35	102.0	25.25	1187	18.77	0.85	37.42	D	25.6	78
NB	LT-RT	0.99	*	0.38	102.0	23.95	406	32.91	1.00	56.86	E	11.8	36

DIR	Delay	LOS
EB	17.03	C
WB	37.42	D
NB	56.86	E

INTERSECTION DELAY = 35.47 INTERSECTION LOS=D

I
#3
PM

MS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-20-1989 14:5
OJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: MW

985 HCM — CHAPTER 9: SIGNALIZED

[redacted]
000 BRA SCENARIO II - PM PEAK
AST DATA SET NAMES LOADED OR SAVED
OLUME=3PM-II GEOMETRICS=3PM-II SIGNAL=3PM-II
OCATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
	76	1	139	216	0	1	0	0.0	12.0	0.0	30
B	46	7	54	107	0	1	0	0.0	12.0	0.0	30
B	112	963	4	1079	0	2	0	0.0	11.0	0.0	60
B	22	481	99	602	0	2	0	0.0	11.0	0.0	60

OTAL VOLUME = 2004

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
R	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	0.0%	3.0%	N	3	0	.950	0	Y	14.5	3
B	0.0%	3.0%	N	3	0	.950	0	Y	14.5	3
B	0.0%	3.0%	N	5	0	.950	0	Y	22.0	3
	0.0%	3.0%	N	0	0	.950	0	Y	22.0	

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*	*						7.8	0	A
2									*	*	*		*	*	*		50.3	4	A
3				*				*				*				*	0.0	10	A
4	*	*	*		*	*	*										25.8	4	A

CLE=102.0 LOST=18.0 SUM V/S CRIT= 0.54 TOTAL V/C= 0.65

EVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	LT-TH-RT	0.65	*	0.25	102.0	25.89	348	3.40	0.85	24.89	C	4.8	15
B	LT-TH-RT	0.38		0.25	102.0	23.91	296	0.00	0.85	20.32	C	2.4	8
B	LT-TH-RT	0.65	*	0.57	102.0	11.41	1827	0.66	0.65	10.26	B	13.8	42
B	LT-TH-RT	0.55		0.49	102.0	13.67	1208	0.26	0.85	11.84	B	9.1	28

IR	Delay	LOS
B	24.89	C
B	20.32	C
B	10.26	B
B	11.84	B

TERSECTION DELAY = 12.77 INTERSECTION LOS=B

1995
#4
PM
(BTD ANALYSIS)

CO[redacted] STREET
[redacted]
Date: 08-15-1989 Time: 19:30:05

1985 HCM - CHAPTER 9: SIGNALIZED CINCH VERSION 2.0
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=5PM GEOMETRICS=5PM SIGNAL=5PM

LOCATED IN CBD:N

VOLUME & GEOMETRICS

		VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	STREET	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	BATTERY STREET	7	3	11	21	0	1	0	0.0	12.0	0.0	30
WB	BATTERY STREET	93	5	63	161	0	1	0	0.0	12.0	0.0	30
NB	COMMERCIAL STREET	22	1781	29	1832	0	2	0	0.0	11.0	0.0	60
SB	COMMERCIAL STREET	35	685	30	750	0	2	0	0.0	11.0	0.0	60

TOTAL VOLUME = 2764

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	5	0	.950	0	Y	14.5	3
WB	0.0%	3.0%	N	5	0	.950	0	Y	14.5	3
NB	0.0%	3.0%	N	5	0	.950	0	Y	22.0	3
SB	0.0%	3.0%	N	5	0	.950	0	Y	22.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									X	X	X						8.0	0	A
2									X	X	X		X	X	X		54.0	4	A
3				X				X				X				X	0.0	18	A
4	X	X	X		X	X	X										14.0	4	A

CYCLE= 102.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	7	3	11	.950	7	3	12
WB	93	5	63	.950	98	5	66
NB	22	1781	29	.950	23	1875	31
SB	35	685	30	.950	37	721	32

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	22	1	1.00	22	0.33	0.52
WB	LT-TH-RT	169	1	1.00	169	0.58	0.39
NB	LT-TH-RT	1928	2	1.05	2025	0.01	0.02
SB	LT-TH-RT	789	2	1.05	829	0.05	0.04

COMMERCIAL STREET/BATTERY STREET
1995 PM PEAK - DESIGN YEAR
date: 08-15-1989 time: 19:30:07

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.829	0.976	1435
WB	LT-TH-RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.847	1.000	1502
NB	LT-TH-RT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	0.998	0.989	3382
SB	LT-TH-RT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	0.994	0.542	1848

SUPPLEMENTAL WORKSHEET FOR
LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto	LGo
EB	102	14	1	22	15	7	0.33	1	72	0.58	0
WB	102	14	1	169	72	98	0.58	1	15	0.33	0
SB	102	54	2	789	789	37	0.05	2	1399	0.01	8

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1535	0.047	9.695	0.830	0.333	4.305	0.667	2.329	1.355	0.976	0.976
WB	1610	0.009	13.187	0.866	0.578	0.813	0.422	0.432	1.299	1.000	1.000
SB	3518	0.398	35.588	0.001	0.604	18.412	0.396	1.311	1800.000	0.084	0.542

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	22	1435	0.02	0.14	197	0.11	
WB	LT-TH-RT	169	1502	0.11	0.14	206	0.82	*
NB	LT-TH-RT	2025	3382	0.60	0.61	2056	0.98	*
SB	LT-TH-RT	829	1848	0.45	0.53	978	0.85	

CYCLE=102.0 LOST=26.0 SUM V/S CRIT= 0.71 TOTAL V/C= 0.95

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CR	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.11		0.14	102.0	29.30	197	0.00	0.85	24.91	C	0.5	2
WB	LT-TH-RT	0.82	*	0.14	102.0	32.52	206	18.62	0.85	43.47	E	4.7	15
NB	LT-TH-RT	0.98	*	0.61	102.0	14.85	2056	12.66	0.85	23.39	C	27.0	82
SB	LT-TH-RT	0.85		0.53	102.0	15.57	978	5.81	0.85	18.17	C	10.5	33

DIR	STREET	DELAY	LOS
EB	BATTERY STREET	24.91	C
WB	BATTERY STREET	43.47	E
NB	COMMERCIAL STREET	23.39	C
SB	COMMERCIAL STREET	18.17	C

INTERSECTION DELAY = 23.09 INTERSECTION LOS=C

#5
PM
(BTD ANALYSIS)

ATLANTIC AVE/COMMERCIAL ST/FLEET ST/EASTERN AVE
[illegible]
Date: 10-02-1989 Time: 14:55:45

1985 HCM - CHAPTER 9: SIGNALIZED CINCH VERSION 2.0
LAST DATA SET NAMES LOADED OR SAVED
VOLUME= GEOMETRICS= SIGNAL=

LOCATED IN CBD:N

VOLUME & GEOMETRICS

		VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	STREET	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	COMMERCIAL STREET	69	0	36	105	0	1	0	0.0	12.0	0.0	28
WB	EASTERN AVENUE	119	0	46	165	0	1	0	0.0	12.0	0.0	28
NB	ATLANTIC AVENUE	0	1618	83	1701	0	2	0	0.0	12.0	0.0	60
SB	COMMERCIAL STREET	~~0~~ 56	1003	0	1003	0	2	0	0.0	12.0	0.0	60

TOTAL VOLUME = 2974

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	Y	5	0	.850	0	Y	14.0	3
WB	0.0%	3.0%	N	0	0	.850	0	Y	14.0	3
NB	0.0%	3.0%	Y	5	0	.950	0	Y	22.0	3
SB	0.0%	3.0%	Y	5	0	.950	0	Y	22.0	3

SIGNAL PHASING

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*		*														13.6	4	A
2					*		*										18.8	4	A
3																	0.0	8	A
4									*	*	*		*	*	*		67.6	4	A

CYCLE= 120.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	69	0	36	.850	81	0	42
WB	119	0	46	.850	140	0	54
NB	0	1618	83	.950	0	1703	87
SB	0	1003	0	.950	0	1056	0

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	124	1	1.00	124	0.66	0.34
WB	LT-RT	194	1	1.00	194	0.72	0.28
NB	TH-RT	1791	2	1.05	1880	0.00	0.05
SB	TH	1056	2	1.05	1109	0.00	0.00

ATLANTIC AVE/COMMERCIAL ST/FLEET ST/EASTERN AVE
1995 PM PEAK
date: 10-02-1992 time: 14:55:47

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.000	0.985	1.000	0.875	1.000	1.000	0.854	0.811	1074
WB	LT-RT	1800	1	1.000	0.985	1.000	1.000	1.000	1.000	0.862	0.803	1227
NB	TH-RT	1800	2	1.000	0.985	1.000	0.937	1.000	1.000	0.993	1.000	3300
SB	TH	1800	2	1.000	0.985	1.000	0.937	1.000	1.000	1.000	1.000	3324

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	124	1074	0.12	0.11	122	1.01	*
WB	LT-RT	194	1227	0.16	0.16	192	1.01	*
NB	TH-RT	1880	3300	0.57	0.56	1859	1.01	*
SB	TH	1109	3324	0.33	0.56	1872	0.59	

CYCLE=120.0 LOST=20.0 SUM V/S CRIT= 0.84 TOTAL V/C= 1.01

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	1.01	*	0.11	120.0	40.47	122	65.34	1.00	105.82	F	6.5	21
WB	LT-RT	1.01	*	0.16	120.0	38.55	192	52.54	1.00	91.09	F	9.1	28
NB	TH-RT	1.01	*	0.56	120.0	20.21	1859	18.34	0.85	32.77	D	34.2	104
SB	TH	0.59		0.56	120.0	13.05	1872	0.33	0.85	11.37	B	15.4	47

DIR	STREET	DELAY	LOS
EB	COMMERCIAL STREET	105.82	F
WB	EASTERN AVENUE	91.09	F
NB	ATLANTIC AVENUE	32.77	D
SB	COMMERCIAL STREET	11.37	B

INTERSECTION DELAY = 31.75 INTERSECTION LOS=D

#6
PM

985 HCM - CHAPTER 9: SIGNALIZED

LANTIC AVE /[redacted]
OO [redacted]
ST DATA SET NAMES LOADED OR SAVED
LUME=6PM-II   GEOMETRICS=6PM-II   SIGNAL=6PM-II
CATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
R	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
	13	0	21	34	0	1	0	0.0	10.0	0.0	10
	186	2	89	277	0	1	0	0.0	12.0	0.0	30
	23	688	74	785	0	2	0	0.0	12.0	0.0	60
	147	400	28	575	0	2	0	0.0	12.0	0.0	60

TAL VOLUME = 1671

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
R	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
	0.0%	3.0%	N	3	0	.900	50	N	14.5	3
	.0%	3.0%	Y	5	0	.900	50	Y	14.5	3
	.0%	3.0%	N	5	0	.900	50	Y	22.0	3
	.0%	3.0%	N	0	0	.900	50	Y	22.0	3

HASINGS

	ASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
	*	*	*		*	*	*										32.2	4	A
									*	*	*		*	*	*		39.8	4	A
				*				*				*				*	0.0	20	A

CLE=100.0 LOST=28.0 SUM V/S CRIT= 0.57 TOTAL V/C= 0.79

EVEL OF SERVICE WORKSHEET

R	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
	LT-RT	0.12		0.32	100.0	18.16	314	0.00	0.85	15.44	C	0.7	3
	LT-TH-RT	0.79	*	0.32	100.0	23.41	390	8.70	0.85	27.30	D	5.9	19
	LT-TH-RT	0.79	*	0.40	100.0	20.08	1161	3.13	0.85	19.73	C	14.6	45
	LT-TH-RT	0.77		0.40	100.0	19.86	872	3.56	0.85	19.91	C	10.7	33

R	Delay	LOS
	15.44	C
	27.30	D
	19.73	C
	19.91	C

TERSECTION DELAY = 20.91 INTERSECTION LOS=C

#7
PM

985 HCM — CHAPTER 9: SIGNALIZED

[redacted] PM PEAK
AST DATA SET NAMES LOADED OR SAVED
LUME=8PM-II GEOMETRICS=8PM-II SIGNAL=8PM-II
CATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	646	1154	0	1800	1	2	0	12.0	12.0	0.0	60
B	0	0	510	510	0	0	2	0.0	0.0	12.0	60

TAL VOLUME = 2310

RAFFIC & ROADWAY CONDITIONS

			ADJ	PARK			PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	0.0%	0.0%	N	3	0	.000	0	N	7.0	0
B	0.0%	0.0%	N	5	0	.000	0	N	7.0	0
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*							47.2	4	A
2															*		24.8	4	A
3				*				*				*				*	0.0	20	A

YCLE=100.0 LOST=28.0 SUM V/S CRIT= 0.65 TOTAL V/C= 0.90

EVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	LT	0.90	*	0.47	100.0	18.45	795	10.86	1.00	29.31	D	12.9	39
B	TH	0.80		0.47	100.0	17.07	1675	2.47	0.85	16.61	C	18.8	57
B	RT	0.90	*	0.25	100.0	27.69	659	12.60	0.85	34.25	D	12.9	40

IR	Delay	LOS
B	21.02	C
B	34.25	D

NTERSECTION DELAY = 23.98 INTERSECTION LOS=C

#8
PM

TAMS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-21-1989
16:19:33
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 [redacted] CHAPTER 9: SIGNALIZED
[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=9PM-II2 GEOMETRICS=9PM-II2 SIGNAL=9PM-II2
LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	103	88	0	191	1	1	0	12.0	12.0	0.0	30
WB	0	217	126	343	0	1	0	0.0	12.0	0.0	60
NB	254	1571	0	1825	0	3	0	0.0	12.0	0.0	60
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 2359

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
WB	0.0%	3.0%	N	5	0	.900	50	Y	22.0	1
NB	0.0%	3.0%	Y	5	0	.900	50	Y	22.0	3
SB	0.0%	0.0%	N	0	0	.000	0	N	22.0	0

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1									*	*	*						53.0	4	A
2	*	*															10.0	4	A
3						*	*										35.0	4	A
4				*				*				*				*	0.0	10	A

CYCLE=120.0 LOST=22.0 SUM V/S CRIT= 0.76 TOTAL V/C= 0.93

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.82	*	0.08	120.0	41.11	140	24.35	1.00	65.46	F	4.5	14
EB	TH	0.66		0.08	120.0	40.55	148	8.35	0.85	41.57	E	3.0	10
WB	TH-RT	0.87	*	0.29	120.0	30.62	440	13.39	1.22	53.70	E	11.9	37
NB	LT-TH	0.99	*	0.44	120.0	25.27	2251	12.93	0.85	32.47	D	42.6	129

DIR	Delay	LOS
EB	54.45	E
WB	53.70	E
NB	32.47	D

INTERSECTION DELAY = 36.99 INTERSECTION LOS=D

TAMS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-19-1989
15:54:33
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 HCM — CHAPTER 9: SIGNALIZED

18: [redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=18-PMSC2 GEOMETRICS=18-PMSC2 SIGNAL=18-PMSC2
LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
WB	136	335	0	471	1	1	0	12.0	12.0	0.0	48
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	192	1049	387	1628	0	3	0	0.0	12.0	0.0	36

TOTAL VOLUME = 2099

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	0.0%	N	5	0	.000	0	N	15.0	0
WB	0.0%	3.0%	N	0	0	.900	50	Y	15.0	3
NB	0.0%	0.0%	N	5	0	.000	0	Y	12.0	0
SB	0.0%	3.0%	N	5	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1								*					*	*	*		34.0	4	A
2					*	*										*	18.0	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.61 TOTAL V/C= 0.70

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
WB	LT	0.30		0.30	60.0	12.26	506	0.00	1.00	12.26	B	1.8	6
WB	TH	0.70	*	0.30	60.0	14.13	532	3.33	0.85	14.84	B	[illegible]	[illegible]
SB	LT-TH-RT	0.70	*	0.57	60.0	7.10	2846	0.64	0.85	6.57	B	13.1	40

DIR	Delay	LOS
WB	14.10	B
SB	6.57	B

INTERSECTION DELAY = 8.14 INTERSECTION LOS=B

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

AST DATA SET NAMES LOADED OR SAVED
LUME=10-PMSC2 GEOMETRICS=10-PMSC2 SIGNAL=10-PMSC2
OCATED IN CBD:N

VOLUME & GEOMETRICS

IR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
B	384	155	0	539	2	1	0	12.0	12.0	0.0	30
B	0	0	341	341	0	0	2	0.0	0.0	12.0	60
B	0	1196	18	1214	0	2	1	0.0	12.0	12.0	60
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0

OTAL VOLUME = 2094

TRAFFIC & ROADWAY CONDITIONS

IR	GRADE	%HV	ADJ Y/N	PARK MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	1
B	0.0%	0.0%	N	0	0	.000	0	N	22.0	0

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1	*	*															9.7	4	A
2										*	*						27.8	-	A
3							*										10.6	4	A

YCLE= 60.0 LOST=12.0 SUM V/S CRIT= 0.68 TOTAL V/C= 0.85

LEVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	LT	0.85	*	0.16	60.0	18.58	527	10.26	1.00	28.85	D	7.4	23
B	TH	0.60		0.16	60.0	17.76	286	2.42	0.85	17.15	C	2.4	8
B	RT	0.85	*	0.18	60.0	18.21	468	11.36	0.85	25.13	D	6.0	19
B	TH	0.85	*	0.46	60.0	10.85	1641	3.69	1.23	17.90	C	14.5	45
B	RT	0.03		0.46	60.0	6.67	697	0.00	1.54	10.27	B	0.2	1

IR	Delay	LOS
B	25.60	D
B	25.13	D
B	17.79	C

NTERSECTION DELAY = 20.98 INTERSECTION LOS=C

-S Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC.
OJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP 11-22-1989 13:

1985 HCM - CHAPTER 9: SIGNALIZED

[redacted]

AST DATA SET NAMES LOADED OR SAVED
LUME=19-PMSC2 GEOMETRICS=19-PMSC2 SIGNAL=19-PMSC2
CATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
	T	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
	0	392	18	410	0	3	0	0.0	12.0	0.0	36
	0	0	0	0	0	0	0	0.0	0.0	0.0	0
	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	147	1002	0	1149	0	3	0	0.0	12.0	0.0	36

TAL VOLUME = 1559

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
	0.0%	3.0%	N	5	0	.900	50	Y	12.0	1
	0.0%	0.0%	N	0	0	.900	0	Y	12.0	0
	0.0%	0.0%	N	5	0	.000	0	Y	12.0	0
	0.0%	3.0%	N	5	0	.900	50	Y	12.0	2

PHASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
			*									*	*			31.0	4	A
	*	*													*	21.0	4	A

CLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.36 TOTAL V/C= 0.41

LEVEL OF SERVICE WORKSHEET

LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
TH-RT	0.27	*	0.35	60.0	10.64	1850	0.00	1.54	16.39	C	5.2	16
LT-TH	0.51	*	0.52	60.0	7.24	2749	0.02	1.08	7.84	B	10.3	32

Delay	LOS
16.39	C
7.84	B

TERSECTION DELAY = 10.09 INTERSECTION LOS=B

#12
PM

985 HCM - CHAPTER 9: SIGNALIZED

[redacted]

AST DATA SET NAMES LOADED OR SAVED
LUME=11-PMSC2   GEOMETRICS=11-PMSC2   SIGNAL=11-PMSC2
CATED IN CBD:N

OLUME & GEOMETRICS

R	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
	302	18	0	320	1	1	0	12.0	12.0	0.0	60
	0	260	0	260	0	1	0	0.0	12.0	0.0	60
	204	911	109	1224	0	3	0	0.0	12.0	0.0	60
	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TAL VOLUME = 1804

RAFFIC & ROADWAY CONDITIONS

R	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
	0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
	0.0%	3.0%	N	5	0	.900	50	Y	22.0	2
	0.0%	3.0%	Y	5	0	.900	50	Y	22.0	1
	0.0%	0.0%	N	0	0	.000	0	N	22.0	0

HASINGS

EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
*	*															14.5	4	A
								*	*	*						21.6	4	A
				*	*							*				11.9	4	A

CLE= 60.0 LOST=12.0 SUM V/S CRIT= 0.66 TOTAL V/C= 0.82

EVEL OF SERVICE WORKSHEET

R LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
LT	0.82	*	0.24	60.0	16.38	407	10.68	1.00	27.06	D	5.4	17
TH	0.05		0.24	60.0	13.26	428	0.00	0.85	11.27	B	0.3	1
TH	0.82	*	0.20	60.0	17.54	350	12.16	0.98	29.04	D	5.0	16
LT-TH-RT	0.82	*	0.36	60.0	13.26	1815	2.70	1.25	19.94	C	17.0	52

R	Delay	LOS
	26.17	D
	29.04	D
	19.94	C

TERSECTION DELAY = 22.20 INTERSECTION LOS=C

#13
PM

…985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

…AST DATA SET NAMES LOADED OR SAVED
…OLUME=20-PMSC2 GEOMETRICS=20-PMSC2 SIGNAL=20-PMSC2
…OCATED IN CBD:N

…OLUME & GEOMETRICS

…IR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
…B	0	148	0	148	0	1	0	0.0	15.0	0.0	20
…B	265	199	0	464	1	1	0	12.0	12.0	0.0	36
…B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
…B	172	1135	14	1321	0	3	0	0.0	12.0	0.0	36

…TAL VOLUME = 1933

…RAFFIC & ROADWAY CONDITIONS

…IR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
…	0.0%	3.0%	N	0	0	.900	50	Y	12.0	1
…	…0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
…	0.0%	0.0%	N	0	0	.000	50	Y	12.0	0
…	…0.0%	3.0%	N	5	0	.900	50	Y	12.0	3

…HASINGS

EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
	*			*	*										*	21.6	4	A
							*					*	*	*		30.4	4	A

…CLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.53 TOTAL V/C= 0.61

…EVEL OF SERVICE WORKSHEET

…R	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
…	TH	0.23		0.36	60.0	10.18	704	0.00	1.54	15.67	C	1.8	6
…	LT	0.61	*	0.36	60.0	11.97	479	1.70	0.85	11.62	B	3.1	10
…	TH	0.35		0.36	60.0	10.65	640	0.00	0.85	9.05	B	2.4	8
…	LT-TH-RT	0.61	*	0.51	60.0	8.08	2627	0.31	0.85	7.13	B	12.1	37

…R	Delay	LOS
…	15.67	C
…	10.52	B
…	7.13	B

…TERSECTION DELAY = 8.50 INTERSECTION LOS=B

#14
PM

?MS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-19-1989
15:28:00
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 HCM - CHAPTER 9: SIGNALIZED
13[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=13-PMSC2 GEOMETRICS=13-PMSC2 SIGNAL=13-PMSC2
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
WB	133	61	0	194	0	2	0	0.0	12.0	0.0	36
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	0	1188	215	1403	0	2	1	0.0	12.0	12.0	36

TOTAL VOLUME = 1597

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%		0	0	.000	0	Y	12.0	0
WB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
NB	0.0%	0.0%	N	0	0	.000	0	Y	12.0	0
SB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1								*						*	*		41.0	4	A
2					*	*										*	11.0	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.45 TOTAL V/C= 0.52

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
WB	LT-TH	0.35	*	0.18	60.0	16.24	650	0.00	0.85	13.81	B	2.9	10
SB	TH	0.57	*	0.68	60.0	3.75	2424	0.19	0.85	3.35	A	7.0	22
SB	RT	0.23		0.68	60.0	2.72	1030	0.00	0.85	2.31	A	1.3	5

DIR	Delay	LOS
WB	13.81	B
SB	3.20	A

INTERSECTION DELAY = 4.50 INTERSECTION LOS=A

#16
PM

PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 HCM — CHAPTER 9: SIGNALIZED

14: [redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=14-PMSC2 GEOMETRICS=14-PMSC2 SIGNAL=14-PMSC2
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	312	767	0	1079	1	2	0	12.0	12.0	0.0	36
WB	0	0	581	581	0	0	3	0.0	0.0	12.0	60
NB	0	838	162	1000	0	4	0	0.0	12.0	0.0	48
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 2660

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3
WB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3
NB	0.0%	3.0%	N	0	0	.900	50	Y	15.0	3
SB	0.0%	0.0%	N	5	0	.000	50	Y	15.0	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*						*	*						14.0	4	A
2							*					*					14.1	4	A
3	*	*															20.0	4	A

CYCLE= 60.0 LOST=12.0 SUM V/S CRIT= 0.61 TOTAL V/C= 0.76

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.62		0.33	60.0	12.79	560	1.52	1.00	14.31	B	3.9	12
EB	TH	0.76	*	0.33	60.0	13.58	1180	2.44	0.85	13.62	B	9.5	29
WB	RT	0.76	*	0.23	60.0	16.25	936	3.05	0.85	16.41	C	8.2	26
NB	TH-RT	0.76	*	0.23	60.0	16.30	1611	1.80	0.85	15.38	C	14.2	44

DIR	Delay	LOS
EB	13.81	B
WB	16.41	C
NB	15.38	C

INTERSECTION DELAY = 15.00 INTERSECTION LOS=B

1985 HCM - CHAPTER 9: SIGNALIZED

[redacted] WASHINGTON ST./CAUSEWAY ST.
[illegible]000 BRA SCENARIO III - AM PEAK
[illegible]AST DATA SET NAMES LOADED OR SAVED
[illegible]OLUME=1AM-III5 GEOMETRICS=1AM-III5 SIGNAL=1AM-III5
[illegible]

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	214	129	19	362	2	1	0	12.0	12.0	0.0	60
WB	267	384	353	1004	0	2	1	0.0	12.0	12.0	60
NB	231	225	108	564	0	2	1	0.0	12.0	12.0	60
SB	700	513	494	1707	2	1	1	12.0	12.0	12.0	60

[illegible]OTAL VOLUME = 3637

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	3
WB	[illegible]0%	3.0%	N	[illegible]	[illegible]	.[illegible]	[illegible]	Y	22.[illegible]	[illegible]
NB	0.0%	3.0%	N	3	0	.950	0	Y	22.0	[illegible]
SB	[illegible]	3.0%	N	[illegible]	0	.950	0	Y	22.[illegible]	[illegible]

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
1													*	*	*		20.5	0	A
2							*						*	*	*		20.5	4	A
3							*		*	*	*			*	*		45.1	4	A
4	*	*	*				*								*		12.6	4	A
5		*	*		*	*	*										35.2	4	A

[illegible]YCLE=150.0 LOST=16.0 SUM V/S CRIT= 0.67 TOTAL V/C= 0.75

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.87	*	0.08	150.0	31.60	[illegible]	19.51	1.00	71.1[illegible]	[illegible]	[illegible]0.1	31
EB	TH-RT	0.26		0.35	150.0	26.83	601	0.00	0.85	22.81	[illegible]	4.2	14
[illegible]	[illegible]	[illegible].87	*	[illegible]	150.0	[illegible]	[illegible]50	[illegible]	[illegible]	[illegible]	[illegible]	21.8	66
[illegible]	[illegible]	[illegible].29		[illegible].34	150.0	[illegible]	[illegible]61	0.00	[illegible].85	1.7[illegible]	[illegible]	[illegible].5	9
[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]	[illegible]46	[illegible].21	[illegible].85	[illegible]	[illegible]	[illegible]	43
[illegible]	[illegible]	0.25		[illegible]	150.0	[illegible]	[illegible]54	0.00	0.85	[illegible]		[illegible].3	11
[illegible]	[illegible]	[illegible].87	[illegible]	[illegible]	150.0	19.41	[illegible]93	7.32	1.00	46.7[illegible]	[illegible]	[illegible].6	72
[illegible]	[illegible]	[illegible].51		[illegible]	150.0	[illegible]	[illegible]66	[illegible]	[illegible].85	[illegible]	[illegible]	[illegible]	28
[illegible]	[illegible]	[illegible].48		[illegible]	150.0	[illegible]	[illegible]	0.00	[illegible].85	[illegible].1[illegible]	[illegible]	[illegible].2	20

[illegible] Delay LOS
[illegible]
[illegible]
[illegible] 7.57 [illegible]
[illegible]
[illegible] INTERSECTION [illegible]

#2
AM

PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: MW

1985 HCM - CHAPTER 9: SIGNALIZED

COMMERCIAL ST./CHARTER ST.
2000 BRA SCENARIO III - AM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=2AM-III GEOMETRICS=2AM-III SIGNAL=2AM-III
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
[illegible]	0	711	0	711	0	2	0	0.0	11.0	0.0	60
[illegible]	0	791	0	791	0	2	0	0.0	11.0	0.0	60
[illegible]	240	0	44	284	0	1	0	0.0	12.0	0.0	30
[illegible]	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 1786

TRAFFIC & ROADWAY CONDITIONS

[illegible]

PHASINGS

[illegible] 33.7 [illegible]

CYCLE=102.0 LOST=28.0 SUM V/S CRIT= 0.53 TOTAL V/C= 0.74

LEVEL OF SERVICE WORKSHEET

DR LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
[illegible]	[illegible].66		[illegible].35	102.0	[illegible].48	[illegible]188	[illegible].10	0.85	[illegible]	[illegible]	[illegible]3.9	42
[illegible]	[illegible].74	*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible].04	[illegible].35	[illegible]	[illegible]	15.4	47
[illegible]	[illegible].74	*	[illegible].38	102.0	[illegible].73	406	[illegible].74	1.00	[illegible].46	[illegible]	5.5	17

[illegible] Delay LOS
[illegible]

INTERSECTION DELAY = [illegible].34 INTERSECTION LOS=[illegible]

#3
AM

[illegible] Consultants Inc. USING CINCH (VER 2.0) BY [illegible] ASSOCIATES, INC. 12-07-1999
[illegible]:27:51
PROJECT NAME: Harborpark [illegible] PROJECT NUMBER: [illegible]

1985 HCM – CHAPTER 9: SIGNALIZED

[redacted]HANOVER ST.
2000 BRA SCENARIO III - AM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=9AM-III GEOMETRICS=9AM-III SIGNAL=9AM-III
[illegible] CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
[illegible]	147	1	70	[illegible]	0	1	0	0.0	12.0	0.0	30
[illegible]	9	1	7	17	0	1	0	0.0	12.0	0.0	30
[illegible]	24	697	13	734	0	2	0	0.0	11.0	0.0	30
[illegible]	18	626	96	740	0	2	0	0.0	11.0	0.0	30

TOTAL VOLUME = [illegible]

TRAFFIC & ROADWAY CONDITIONS

ADJ PARK PEDESTRIANS ARR
[illegible] GRADE %HV [illegible] MOVES BUSES [illegible] CROSS BUT MIN TIME TYPE
[illegible]

PHASINGS

[illegible]

CYCLE=[illegible] LOST=12.0 SUM V/S CRIT= [illegible].40 TOTAL V/C= [illegible]

LEVEL OF SERVICE WORKSHEET

[illegible]	LN GROUP	v/c	1.1 g/C	[illegible]	d1	[illegible]	[illegible]	d2	Delay	LOS	Avg Q	95% Q
[illegible]	LT-TH-RT	0.49	[illegible]	102.0	[illegible]	[illegible]	[illegible]	0.85	[illegible]	[illegible]	4.0	13
[illegible]	LT-TH-RT	0.05	[illegible]	[illegible]	[illegible]	[illegible]	0.00	[illegible]	[illegible]	[illegible]	0.4	2
[illegible]	LT-TH-RT	0.45	0.54	102.0	10.87	1791	0.00	0.85	9.24	B	10.1	31
[illegible]	LT-TH-RT	0.49	0.54	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.2	31

[illegible] Delay LOS
[illegible]

INTERSECTION DELAY = [illegible] INTERSECTION LOS = [illegible]

#6
AM

1985 HCM - CHAPTER 9: SIGNALIZED

ATLANTIC AVE /COMMERCIAL WHARF
2000 BRA SCENARIO [illegible] AM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=6AM-III   GEOMETRICS=6AM-III   SIGNAL=6AM-III
LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	37	0	37	74	0	1	0	0.0	10.0	0.0	10
WB	63	1	67	131	0	1	0	0.0	12.0	0.0	30
NB	14	243	56	313	0	2	0	0.0	12.0	0.0	60
SB	129	775	28	932	0	2	0	0.0	12.0	0.0	60

TOTAL VOLUME = 1450

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	3.0%	N	3	0	.900	50	N	14.5	3
WB	0.0%	3.0%	Y	5	0	.900	50	Y	14.5	3
NB	[illegible]	[illegible]	N	5	0	.900	50	Y	22.0	3
SB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE.ACT
1					*	*	*										18.5	4	A
2									*	*	*		*	*	*		53.5	4	A
3				*				*				*				*	0.0	20	A

CYCLE=100.0 LOST=28.0 SUM V/S CRIT= 0.46 TOTAL V/C= 0.63

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.42		0.18	100.0	27.38	197	0.00	0.85	23.27	C	1.9	6
WB	LT-TH-RT	0.63	*	0.18	100.0	28.62	230	4.24	0.85	27.93	D	3.3	11
NB	LT-TH-RT	0.27		0.54	100.0	9.59	1348	0.00	0.85	8.15	B	4.5	14
SB	LT-TH-RT	0.63	*	0.54	100.0	12.41	1715	0.59	0.85	11.05	B	13.4	41

DIR	Delay	LOS
EB	23.27	C
WB	27.93	D
NB	8.15	B
SB	11.05	B

INTERSECTION DELAY = 12.48 INTERSECTION LOS=B

III
#7
AM

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]
000 BRA SCENARIO III - AM PEAK
ST DATA SET NAMES LOADED OR SAVED
OLUME=8AM-III GEOMETRICS=8AM-III SIGNAL=8AM-III
ATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
E	0	0	0	0	0	0	0	0.0	0.0	0.0	0
	0	0	0	0	0	0	0	0.0	0.0	0.0	0
	271	336	0	607	1	2	0	12.0	12.0	0.0	60
	0	0	856	856	0	0	2	0.0	0.0	12.0	60

TOTAL VOLUME = 1463

TRAFFIC & ROADWAY CONDITIONS

#	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	0.0%	N	5	0	.000	0	N	7.0	0
B	.0%	0.0%	N	5	0	.000	0	N	7.0	0
B	0.0%	3.0%	N	5	0	.700	50	Y	22.0	3
	.0%	3.0%	N		0	.900	50	Y	22.0	

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	...
1									*	*							23.2	4	A
2															*		48.8	4	A
3				*				*				*				*	0.0	20	A

CYCLE=100.0 LOST=28.0 SUM V/S CRIT= 0.55 TOTAL V/C= 0.77

LEVEL OF SERVICE WORKSHEET

IR LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
LT	0.77	*	0.23	100.0	27.28	391	7.56	1.00	34.84	D	7.0	22
TH	0.48		0.23	100.0	25.18	824	0.00	0.85	21.41	C	8.0	25
RT	0.77	*	0.49	100.0	15.96	1298	2.42	0.85	15.63	C	13.5	42

IR	Delay	LOS
	27.24	D
B	15.63	C

INTERSECTION DELAY = 20.39 INTERSECTION LOS=C

#8
AM

[illegible] Consultants Inc.   USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC.   11-21-1989
16:55:27
PROJECT NAME: Harborpark IPOD   PROJECT NUMBER: [illegible]

1985 HCM - CHAPTER 9: SIGNALIZED

[redacted] AM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=9AM-III2   GEOMETRICS=9AM-III2   SIGNAL=9AM-III2
[illegible]

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	66	141	0	207	1	1	0	12.0	12.0	0.0	30
WB	0	61	27	88	0	1	0	0.0	12.0	0.0	60
NB	361	515	0	876	0	3	0	0.0	12.0	0.0	60
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 1171

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN. TIME	ARR TYPE
EB	0.0%	2.0%	N	[illegible]	[illegible]	.900	50	Y	22.0	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		22.0	
NB	[illegible]	2.0%	[illegible]	[illegible]	[illegible]	.900	30	Y	22.0	[illegible]
[illegible]	[illegible]	[illegible]	N	[illegible]	[illegible]	.900	[illegible]	N	[illegible]	

PHASINGS

[illegible]	[illegible]	[illegible]	SOUTHBOUND	GREEN	[illegible]	[illegible]
[illegible]				16.0	4	A
2 * *				9.0	4	A
3	* *			13.0	4	A
*	*	*	*	0.0	[illegible]	A

CYCLE= 60.0   LOST=22.0   SUM V/S CRIT= 0.36 TOTAL V/C= 0.57

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	[illegible]	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.29		0.15	60.0	17.22	252	0.00	1.00	17.22	[illegible]	1.0	4
[illegible]	[illegible]	[illegible]	*	[illegible]	[illegible]	[illegible]	236	[illegible]	[illegible]	[illegible]	[illegible]	2.2	8
WB	TH-RT	0.30	*	0.22	60.0	14.95	330	0.00	1.54	[illegible]	[illegible]	1.5	5
NB	LT-TH	0.79	*	0.27	60.0	15.52	1359	2.66	0.85	15.46	[illegible]	11.9	37

DIR	Delay	LOS
EB	17.24	[illegible]
WB	23.02	
NB	15.46	

[illegible] CONSULTANTS [illegible] USING CINCH (VER [illegible]) [illegible] 11-22-1989 [illegible]
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: HP

1985 HCM - CHAPTER 9: SIGNALIZED

[illegible]: PURCHASE/STATE (SURFACE ARTERY/STATE)
2000 AM SCENARIO III
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=18-AMSC3 GEOMETRICS=18-AMSC3 SIGNAL=18-AMSC3
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
WB	58	364	0	422	1	1	0	12.0	12.0	0.0	48
[illegible]	0	0	0	0	0	0	0	0.0	0.0	0.0	[illegible]
[illegible]	207	1492	964	2663	0	3	0	0.0	12.0	0.0	36

TOTAL VOLUME = 3085

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%	N	5	0	.000	0	N	15.0	0
WB	0.0%	3.0%	N	0	0	.900	50	Y	15.0	3
[illegible]	0.0%	0.0%	N	[illegible]	0	.000	0	Y	12.0	[illegible]
[illegible]	0.0%	3.0%	N	[illegible]	0	.900	50	Y	12.0	3

PHASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
																[illegible]	[illegible]	[illegible]
																[illegible]	[illegible]	[illegible]

CLE=120.0 LOST= 8.0 SUM V/S CRIT= 0.88 TOTAL V/C= 0.95

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
WB	LT	0.16		0.24	120.0	27.33	406	0.00	1.00	27.33	D	1.6	6
WB	TH	0.95	*	0.24	120.0	34.04	427	23.78	0.85	49.16	E	12.3	38
[illegible]	LT-TH-RT	0.95	*	0.69	120.0	12.53	3437	5.27	0.85	15.13	C	31.3	95

DIR	Delay	LOS
WB	46.16	E
[illegible]	15.13	C

INTERSECTION DELAY = 19.03 INTERSECTION LOS=C

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TLANTIC AVE./MILK[redacted].
000 [redacted]
ST DATA SET NAMES LOADED OR SAVED
LUME=10AM-III GEOMETRICS=10AM-III SIGNAL=10AM-III
CATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
R	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
[illegible]	180	210	0	390	2	1	0	12.0	12.0	0.0	30
[illegible]	0	0	156	156	0	0	2	0.0	0.0	12.0	60
NB	0	702	17	719	0	2	1	0.0	12.0	12.0	60
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TAL VOLUME = 1265

TRAFFIC & ROADWAY CONDITIONS

			ADJ	PARK			PEDESTRIANS			ARR
R	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
[illegible]	0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
[illegible]	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	0.0%	0.0%	N	0	0	.000	0	N	22.0	0

PHASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
	*															14.7	4	A
									*	*						25.7	4	A
						*										7.6	4	A

CLE= 60.0 LOST=12.0 SUM V/S CRIT= 0.43 TOTAL V/C= 0.54

LEVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
[illegible]	LT	0.26		0.24	60.0	13.92	797	0.00	1.00	13.92	B	2.5	8
EB	TH	0.54	*	0.24	60.0	14.99	433	0.53	0.85	13.20	B	2.9	10
B	RT	0.54	*	0.13	60.0	18.65	338	0.68	0.85	16.43	C	2.5	8
B	TH	0.54	*	0.43	60.0	9.68	1521	0.15	0.85	8.35	B	7.4	23
[illegible]	RT	0.03		0.43	60.0	7.54	646	0.00	0.85	6.41	B	0.2	1

IR	Delay	LOS
	13.54	B
	16.43	C
	8.31	B

TERSECTION DELAY = 10.90 INTERSECTION LOS=B

#11
AM

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

.AST DATA SET NAMES LOADED OR SAVED

.OLUME=19-AMSC3   GEOMETRICS=19-AMSC3   SIGNAL=19-AMSC3

.OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	0	209	12	221	0	3	0	0.0	12.0	0.0	36
WB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	181	1256	0	1437	0	3	0	0.0	12.0	0.0	36

TOTAL VOLUME = 1658

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	5	0	.900	30	Y	12.0	1
WB	0.0%	0.0%	N	0	0	.900	0	Y	12.0	0
NB	0.0%	0.0%	N	5	0	.000	0	Y	12.0	0
SB	0.0%	3.0%	N	5	0	.900	30	Y	12.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	L	T	R	P	L	T	R	P	L	T	R	P	L	T	R	P			
1				*									*	*			31.0	4	A
2		*	*													*	21.0	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.38 TOTAL V/C= 0.44

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH-RT	0.15	*	0.35	60.0	10.15	1847	0.00	1.54	15.64	C	2.7	9
SB	LT-TH	0.64	*	0.52	60.0	7.95	2749	0.39	0.85	7.09	B	12.9	40

DIR	Delay	LOS
EB	15.64	C
SB	7.09	B

INTERSECTION DELAY = 8.23 INTERSECTION LOS=B

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ATLANT[redacted]

LAST DATA SET NAMES LOADED OR SAVED
OLUME=11am-iii   GEOMETRICS=11am-iii   SIGNAL=11AM-III
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	65	7	0	72	1	1	0	12.0	12.0	0.0	60
WB	0	147	0	147	0	1	0	0.0	12.0	0.0	60
NB	256	655	152	1063	0	3	0	0.0	12.0	0.0	60
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

OTAL VOLUME = 1282

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
WB	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
NB	0.0%	3.0%	Y	5	0	.900	50	Y	22.0	3
SB	0.0%	0.0%	N	0	0	.000	0	N	22.0	0

PHASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
																13.[illegible]		
								*	*	*						24.0	4	A
					*							*				11.0	4	A

CYCLE= 60.0 LOST=12.0 SUM V/S CRIT= 0.40 TOTAL V/C= 0.49

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.20	*	0.22	60.0	14.62	365	0.00	1.00	14.62	B	0.9	4
EB	TH	0.02		0.22	60.0	14.05	384	0.00	0.85	11.94	B	0.1	1
WB	TH	0.50	*	0.18	60.0	16.75	325	0.04	0.85	14.27	B	2.2	8
NB	LT-TH-RT	0.65	*	0.40	60.0	11.10	1995	0.60	0.85	9.94	B	11.8	36

DIR	Delay	LOS
EB	14.36	B
WB	14.27	B
NB	9.94	B

INTERSECTION DELAY = 10.63 INTERSECTION LOS=B

AMS Consultants Inc.   USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC.   11-19-1989
17:59:15
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 HCM = CHAPTER 9: SIGNALIZED

[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=20-AMSC3   GEOMETRICS=20-AMSC3   SIGNAL=20-AMSC3
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	0	27	0	27	0	1	0	0.0	15.0	0.0	20
WB	211	193	0	404	1	1	0	12.0	12.0	0.0	36
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	45	1233	95	1373	0	3	0	0.0	12.0	0.0	36

TOTAL VOLUME = 1804

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
WB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
NB	0.0%	0.0%	N	0	0	.000	50	Y	12.0	0
SB	0.0%	3.0%	N	3	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1		*			*	*										*	15.5	4	A
2								*					*	*	*		36.5	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.46 TOTAL V/C= 0.53

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.06		0.26	60.0	12.73	504	0.00	0.85	10.82	B	0.4	2
WB	LT	0.52	*	0.26	60.0	14.48	450	0.26	0.85	12.54	B	2.9	10
WB	TH	0.47		0.26	60.0	14.26	459	0.00	0.85	12.12	B	2.6	9
SB	LT-TH-RT	0.53	*	0.61	60.0	5.15	3183	0.05	0.85	4.42	A	10.0	31

DIR	Delay	LOS
EB	10.82	B
WB	12.34	B
SB	4.42	A

INTERSECTION DELAY = [illegible].16 INTERSECTION LOS=B

PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 HCM - CHAPTER 9: SIGNALIZED

13:[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=13-AMSC3 GEOMETRICS=13-AMSC3 SIGNAL=13-AMSC3
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
WB	51	337	0	388	0	2	0	0.0	12.0	0.0	36
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	0	943	291	1234	0	2	1	0.0	12.0	12.0	36

TOTAL VOLUME = 1622

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%		0	0	.000	0	Y	12.0	0
WB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
NB	0.0%	0.0%	N	0	0	.000	0	Y	12.0	0
SB	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
								*						*	*		36.8	4	A
2					*	*										*	15.2	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.44 TOTAL V/C= 0.51

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
WB	LT-TH	0.51	*	0.25	60.0	14.60	896	0.03	0.85	12.44	B	5.4	17
SB	TH	0.51	*	0.61	60.0	4.92	2178	0.01	0.85	4.20	A	6.7	21
SB	RT	0.35		0.61	60.0	4.32	926	0.00	0.85	3.68	A	2.1	7

DIR	Delay	LOS
WB	12.44	B
SB	4.08	A

INTERSECTION DELAY = 6.09 INTERSECTION LOS=B

#16
AM

AMS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-19-1989
17:02:23
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=14-AMSC3 GEOMETRICS=14-AMSC3 SIGNAL=14-AMSC3
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	407	544	0	951	1	2	0	12.0	12.0	0.0	36
WB	0	0	1188	1188	0	0	3	0.0	0.0	12.0	60
NB	0	774	36	810	0	4	0	0.0	12.0	0.0	48
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 2949

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3
WB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3
NB	0.0%	3.0%	N	0	0	.900	50	Y	15.0	3
SB	0.0%	0.0%	N	5	0	.000	50	Y	15.0	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*						*	*						10.5	4	A
2							*					*					27.3	4	A
3	*	*															20.1	4	A

CYCLE= 70.0 LOST=12.0 SUM V/S CRIT= 0.77 TOTAL V/C= 0.93

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.93	*	0.29	70.0	18.44	485	19.83	1.00	38.27	D	9.4	29
EB	TH	0.62		0.29	70.0	16.43	1021	0.87	0.85	14.71	B	8.4	26
WB	RT	0.93	*	0.39	70.0	15.55	1557	8.40	0.85	20.36	C	17.5	54
NB	TH-RT	0.93	*	0.15	70.0	22.33	1061	11.29	0.85	28.58	D	16.7	51

DIR	Delay	LOS
EB	24.51	C
WB	20.36	C
NB	28.58	D

INTERSECTION DELAY = 23.94 INTERSECTION LOS=C

985 HCM - CHAPTER 9: SIGNALIZED

[redacted]N WASHINGTON ST. /CAUSEWAY ST/
000 BRA SCENARIO III - PM PEAK
AST DATA SET NAMES LOADED OR SAVED
OLUME=1PM-III5   GEOMETRICS=1PM-III5   SIGNAL=1PM-III5
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
B	414	193	3	610	2	1	0	12.0	12.0	0.0	60
B	542	356	423	1321	0	2	1	0.0	12.0	12.0	60
B	86	624	101	811	0	2	1	0.0	12.0	12.0	60
B	571	294	489	1354	2	1	1	12.0	12.0	12.0	60

OTAL VOLUME = 4096

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
R	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	.0%	3.0%	N	3	0	.950	0	Y	22.0	3
B	.0%	3.0%	N	3	0	.950	0	Y	22.0	3
B	0.0%	3.0%	N	5	0	.950	0	Y	22.0	3
B	0.0%	3.0%	N	[illegible]	0	.950	0	Y	22.	[illegible]

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
													*	*	*		15.5	0	A
2							*						*	*	*		15.5	4	A
3							*		*	*	*			*	*		35.5	4	A
4	*	*	*				*								*		22.5	4	A
5		*	*		*	*	*										45.0	4	A

CLE=150.0 LOST=16.0 SUM V/S CRIT= 0.84 TOTAL V/C= 0.94

LEVEL OF SERVICE WORKSHEET

R	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
	LT	0.94	*	0.15	150.0	47.91	489	20.13	1.00	68.04	F	18.4	56
B	TH-RT	0.24		0.48	150.0	17.66	844	0.00	0.85	15.01	C	4.5	14
	LT-TH	0.94	*	0.30	150.0	38.81	1061	11.59	0.85	42.84	E	28.4	86
B	RT	0.34		0.87	150.0	1.37	1311	0.00	0.85	1.16	A	2.4	8
	T-TH	0.94	*	0.24	150.0	42.67	839	13.80	0.85	48.00	E	24.8	75
B	RT	0.30		0.24	150.0	35.75	356	0.00	0.85	30.39	D	3.4	11
	LT	0.94	*	0.21	150.0	44.47	674	16.12	1.00	60.59	F	23.1	70
	H	0.37		0.47	150.0	19.41	833	0.00	0.85	16.50	C	6.8	21
	RT	0.53		0.65	150.0	10.82	974	0.17	0.85	9.35	B	7.6	24

R	Delay	LOS
	51.56	E
	[illegible]	[illegible]
	45.90	E
	[illegible]	[illegible]

ERSECTION DELAY = [illegible].37 INTERSECTION LOS=D

III
#2
PM

PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: [illegible]

1985 HCM — CHAPTER 9: SIGNALIZED

#2 COMMERCIAL ST./CHARTER ST.
2000 BRA SCENARIO III - PM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=2PM-III GEOMETRICS=2PM-III SIGNAL=2PM-III
[illegible]

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	WALK
EB	0	225	0	225	0	[illegible]	0	0.0	11.0	0.0	30
WB	0	1044	0	1044	0	[illegible]	[illegible]	0.0	11.0	0.0	30
NB	340	0	33	373	0	[illegible]	[illegible]	0.0	12.0	0.0	30
SB	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TOTAL VOLUME = 1642

TRAFFIC & ROADWAY CONDITIONS

[illegible]

PHASINGS

[illegible]

CYCLE=102.0 LOST=28.0 SUM V/S CRIT= 0.70 TOTAL V/C= 0.97

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.49		0.38	102.0	13.89	1190	0.00	0.85	13.31	[illegible]	10.2	32
WB	TH	0.97	*	0.38	102.0	24.81	1190	14.83	0.85	33.83	[illegible]	13.6	72
NB	LT-RT	0.97	*	0.38	102.0	13.66	405	23.49	1.00	32.13	[illegible]	10.9	33

DIR	Delay	LOS
EB	13.31	[illegible]
WB	[illegible]	[illegible]
NB	32.13	E

INTERSECTION DELAY = [illegible] INTERSECTION LOS=[illegible]

#3
PM

1985 HCM - CHAPTER 9: SIGNALIZED

COMMERCIAL ST. / HANOVER ST.
2000 BRA SCENARIO III - PM PEAK
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=3PM-III GEOMETRICS=3PM-III SIGNAL=3PM-III

VOLUME & GEOMETRICS

DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
[illegible]	[illegible]	1	141	215	0	1	0	0.0	12.0	0.0	30
[illegible]	46	7	54	107	0	1	0	0.0	12.0	0.0	30
[illegible]	105	951	4	1060	0	2	0	0.0	11.0	0.0	30
[illegible]	[illegible]	491	101	614	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TOTAL VOLUME = 1996

TRAFFIC & ROADWAY CONDITIONS

PHASINGS

[illegible]		A
50.5		A
[illegible]	[illegible]	A
26.1	4	A

CYCLE=1[illegible] LOST=18.0 SUM V/S CRIT= 0.53 TOTAL V/C= 0.64

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.64	*	0.26	102.0	23.7[illegible]	352	3.07	0.85	24.45	C	4.8	15
WB	LT-TH-RT	0.38		0.26	102.0	23.77	298	0.00	0.85	20.20	C	2.4	8
NB	LT-TH-RT	0.64	*	0.57	102.0	11.40	1822	0.61	0.85	10.20	B	13.7	42
SB	LT-TH-RT	0.55		0.49	102.0	13.57	1238	0.24	0.85	[illegible]	B	9.2	29

Delay LOS

#6
PM

S Consultants Inc. SING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-17-1989 18:
JECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: MW

985 HCM - CHAPTER 9: SIGNALIZED

LANTIC AVE./COMM[redacted]
000 BRA SCENAR[redacted]
ST DATA SET NAMES LOADED OR SAVED
LUME=6PM-III GEOMETRICS=6PM-III SIGNAL=6PM-III
CATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
3	12	0	23	35	0	1	0	0.0	10.0	0.0	10
	200	[illegible]	77	279	0	1	0	0.0	12.0	0.0	30
	23	752	72	847	0	2	0	0.0	12.0	0.0	60
3	148	405	25	578	0	2	0	0.0	12.0	0.0	60

TAL VOLUME = 1739

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
3	0.0%	3.0%	N	3	0	.900	50	N	14.5	3
	0.0%	3.0%	Y	5	0	.900	50	Y	14.5	3
	.0%	3.0%	N	5	0	.900	50	Y	22.0	3
5	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3

HASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
*	*	*		*	*	*										30.7	4	A
								*	*	*		*	*	*		41.3	4	A
			*				*				*				*	0.0	20	A

CLE=100.0 LOST=28.0 SUM V/S CRIT= 0.60 TOTAL V/C= 0.83

EVEL OF SERVICE WORKSHEET

R	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
5	LT-RT	0.13		0.31	100.0	19.00	305	0.00	0.85	16.15	C	0.7	3
8	LT-TH-RT	0.83	*	0.31	100.0	24.53	372	12.26	0.85	31.27	D	6.5	20
5	LT-TH-RT	0.83	*	0.41	100.0	19.95	1186	4.32	0.85	20.63	C	15.3	47
8	LT-TH-RT	0.76		0.41	100.0	19.09	886	3.28	0.85	19.01	C	10.5	32

Delay	LOS
16.15	C
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

RSECTION DELAY = 21.64 INTERSECTION LOS=C

III
#7
PM

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]
OD BRA SCENARIO III - PM PEAK
AST DATA SET NAMES LOADED OR SAVED
LUME=8PM-III   GEOMETRICS=8PM-III   SIGNAL=8PM-III
CATED IN CBD:N

VOLUME & GEOMETRICS

IR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	616	1134	0	1750	1	2	0	12.0	12.0	0.0	60
B	0	0	484	484	0	0	2	0.0	0.0	12.0	60

OTAL VOLUME = 2234

TRAFFIC & ROADWAY CONDITIONS

IR	GRADE	%HV	ADJ Y/N	PARK MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
B	0.0%	0.0%	N	3	0	.000	0	N	7.0	0
B	0.0%	0.0%	N	5	0	.000	0	N	7.0	0
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
B	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1									*	*							47.3	4	A
2															*		24.7	4	A
3				*				*				*				*	0.0	20	A

YCLE=100.0 LOST=28.0 SUM V/S CRIT= 0.62 TOTAL V/C= 0.86

LEVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	LT	0.86	*	0.47	100.0	17.78	797	7.65	1.00	25.43	D	11.3	35
B	TH	0.79		0.47	100.0	16.84	1677	2.19	0.85	16.17	C	18.4	56
B	RT	0.86	*	0.25	100.0	27.35	657	9.05	0.85	30.94	D	11.6	36

IR	Delay	LOS
B	19.33	C
B	30.94	D

INTERSECTION DELAY = 21.68 INTERSECTION LOS=C

III, #6, PM

S Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-22-1989 14:
JECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

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[redacted]

DATA SET NAMES LOADED OR SAVED
LUME=9PM-III2 GEOMETRICS=9PM-III2 SIGNAL=9PM-III2
CATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
R	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
3	100	89	0	189	1	1	0	12.0	12.0	0.0	30
3	0	217	126	343	0	1	0	0.0	12.0	0.0	60
3	216	1524	0	1740	0	3	0	0.0	12.0	0.0	60
3	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TAL VOLUME = 2272

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
R	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
3	0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
3	0.0%	3.0%	N	5	0	.900	50	Y	22.0	1
3	0.0%	3.0%	Y	5	0	.900	50	Y	22.0	3
3	0.0%	0.0%	N	0	0	.000	0	N	22.0	0

HASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
								*	*	*						52.0	4	A
*	*															12.0	4	A
				*	*											34.0	4	A
			*				*				*				*	0.0	10	A

CLE=120.0 LOST=22.0 SUM V/S CRIT= 0.74 TOTAL V/C= 0.90

EVEL OF SERVICE WORKSHEET

R	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
3	LT	0.66	*	0.10	120.0	39.54	168	7.25	1.00	46.80	E	3.5	12
3	TH	0.56		0.10	120.0	39.12	177	2.01	0.85	34.96	D	3.0	10
3	TH-RT	0.89	*	0.28	120.0	31.34	427	16.34	1.20	57.44	E	12.5	38
3	LT-TH	0.96	*	0.43	120.0	25.12	2209	9.12	0.85	29.10	D	38.6	117

R	Delay	LOS
3	41.22	E
3	57.44	E
3	29.10	D

TERSECTION DELAY = 34.01 INTERSECTION LOS=D

III
#9
PM

PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

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[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=18-PMSC3 GEOMETRICS=18-PMSC3 SIGNAL=18-PMSC3
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
WB	137	296	0	433	1	1	0	12.0	12.0	0.0	48
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	189	1040	409	1638	0	3	0	0.0	12.0	0.0	36

TOTAL VOLUME = 2071

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%	N	5	0	.000	0	N	15.0	0
WB	0.0%	3.0%	N	0	0	.900	50	Y	15.0	3
NB	0.0%	0.0%	N	5	0	.000	0	Y	12.0	0
SB	0.0%	3.0%	N	5	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1								*					*	*	*		34.0	4	A
2					*	*										*	18.0	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.58 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
WB	LT	0.30		0.30	60.0	12.27	506	0.00	1.00	12.27	B	[illegible]	[illegible]
WB	TH	0.62	*	0.30	60.0	13.71	532	1.58	0.85	12.99	B	3.8	12
SB	LT-TH-RT	0.70	*	0.57	60.0	7.13	2842	0.67	0.85	6.63	B	13.2	40

DIR	Delay	LOS
WB	12.77	B
SB	6.63	B

INTERSECTION DELAY = 7.82 INTERSECTION LOS=B

Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-22-1989 16:2
CT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

T DATA SET NAMES LOADED OR SAVED
UME=10PM-III GEOMETRICS=10PM-III SIGNAL=10PM-III
ATED IN CBD:N

LUME & GEOMETRICS

VOLUMES				# OF LANES			LANE WIDTH			CROSS
LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
367	181	0	548	2	1	0	12.0	12.0	0.0	30
0	0	289	289	0	0	2	0.0	0.0	12.0	60
0	1180	21	1201	0	2	1	0.0	12.0	12.0	60
0	0	0	0	0	0	0	0.0	0.0	0.0	0

AL VOLUME = 2038

RAFFIC & ROADWAY CONDITIONS

		ADJ PARK				PEDESTRIANS			ARR
GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
0.0%	3.0%	N	5	0	.900	50	Y	22.0	3
0.0%	3.0%	N	5	0	.900	50	Y	22.0	1
0.0%	0.0%	N	0	0	.000	0	N	22.0	0

HASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
*	*															11.0	4	A
									*	*						28.0	4	A
						*										9.0	4	A

LE= 60.0 LOST=12.0 SUM V/S CRIT= 0.65 TOTAL V/C= 0.81

EVEL OF SERVICE WORKSHEET

LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
LT	0.72	*	0.18	60.0	17.50	598	3.39	1.00	20.90	C	5.9	18
TH	0.62		0.18	60.0	17.15	325	2.60	0.85	16.78	C	2.7	9
RT	0.84	*	0.15	60.0	18.86	399	12.52	0.85	26.67	D	5.4	17
TH	0.83	*	0.47	60.0	10.60	1655	3.13	1.24	17.08	C	13.9	43
RT	0.03		0.47	60.0	6.59	703	0.00	1.54	10.14	B	0.2	1

Delay	LOS
19.58	C
26.67	D
16.96	C

ERSECTION DELAY = 19.04 INTERSECTION LOS=C

#11F
PM

1985 HCM — CHAPTER 9: SIGNALIZED

[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=19-PMSC3 GEOMETRICS=19-PMSC3 SIGNAL=19-PMSC3
LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	0	378	19	397	0	3	0	0.0	12.0	0.0	36
WB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	169	972	0	1141	0	3	0	0.0	12.0	0.0	36

TOTAL VOLUME = 1538

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	3.0%	N	5	0	.900	50	Y	12.0	3
WB	0.0%	0.0%	N	0	0	.900	0	Y	12.0	0
NB	0.0%	0.0%	N	5	0	.000	0	Y	12.0	0
SB	0.0%	3.0%	N	5	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1				*									*	*			36.0	4	A
2		*	*													*	16.0	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.35 TOTAL V/C= 0.41

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg [redacted]	Q
EB	TH-RT	0.34	*	0.27	60.0	13.50	1409	0.00	0.85	11.48	B	[redacted]	
SB	LT-TH	0.44	*	0.60	60.0	4.94	3192	0.00	0.85	4.20	A	8.5	26

DIR	Delay	LOS
EB	11.48	B
SB	4.20	A

INTERSECTION DELAY = 6.08 INTERSECTION LOS=B

III
#12
PM

985 HCM [redacted] CHAPTER 9: SIGNALIZED

[redacted]
ST DATA SET NAMES LOADED OR SAVED
OLUME=11PM-III GEOMETRICS=11PM-III SIGNAL=11PM-III
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
B	275	18	0	293	1	1	0	12.0	12.0	0.0	60
B	0	237	0	237	0	1	0	0.0	12.0	0.0	60
B	212	925	132	1269	0	3	0	0.0	12.0	0.0	60
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0

OTAL VOLUME = 1799

TRAFFIC & ROADWAY CONDITIONS

			ADJ	PARK			PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	0.0%	3.0%	N	3	0	.900	50	Y	22.0	3
B	0.0%	3.0%	N	5	0	.900	50	Y	22.0	1
B	0.0%	3.0%	Y	5	0	.900	50	Y	22.0	1
B	0.0%	0.0%	N	0	0	.000	0	N	22.0	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*															13.6	4	A
2									*	*	*						23.2	4	A
3						*	*						*				11.2	4	A

YCLE= 60.0 LOST=12.0 SUM V/S CRIT= 0.64 TOTAL V/C= 0.80

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.80	*	0.23	60.0	16.64	383	9.45	1.00	26.09	D	4.8	15
EB	TH	0.05		0.23	60.0	13.78	403	0.00	0.85	11.71	B	0.3	1
B	TH	0.80	*	0.19	60.0	17.75	330	10.78	1.27	36.22	D	5.2	17
B	LT-TH-RT	0.80	*	0.39	60.0	12.40	1942	2.05	1.27	18.35	C	16.5	51

DIR	Delay	LOS
EB	25.21	D
B	36.22	D
B	18.35	C

ITERSECTION DELAY = 21.59 INTERSECTION LOS=C

#13
PM

985 HCM - CHAPTER 9: SIGNALIZED

[redacted]

AST DATA SET NAMES LOADED OR SAVED
LUME=20-PMSC3   GEOMETRICS=20-PMSC3   SIGNAL=20-PMSC3
CATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
B	0	138	0	138	0	1	0	0.0	15.0	0.0	20
B	239	211	0	450	1	1	0	12.0	12.0	0.0	36
B	0	0	0	0	0	0	0	0.0	0.0	0.0	0
B	155	1152	17	1324	0	3	0	0.0	12.0	0.0	36

TAL VOLUME = 1912

RAFFIC & ROADWAY CONDITIONS

			ADJ	PARK			PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
B	0.0%	3.0%	N	0	0	.900	50	Y	12.0	1
B	0.0%	3.0%	N	0	0	.900	50	Y	12.0	3
B	0.0%	0.0%	N	0	0	.000	50	Y	12.0	0
B	0.0%	3.0%	N	5	0	.900	50	Y	12.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1		*			*	*										*	20.1	4	A
2						*							*	*	*		31.9	4	A

YCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.51 TOTAL V/C= 0.59

EVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	TH	0.23		0.34	60.0	10.94	654	0.00	1.54	16.85	C	1.8	6
B	LT	0.59	*	0.34	60.0	12.54	454	1.24	0.85	11.71	B	2.9	10
B	TH	0.39		0.34	60.0	11.62	594	0.00	0.85	9.87	B	2.6	9
B	LT-TH-RT	0.59	*	0.53	60.0	7.26	2765	0.21	0.85	6.35	B	11.5	35

IR	Delay	LOS
B	16.85	C
B	10.85	B
B	6.35	B

TERSECTION DELAY = 8.05 INTERSECTION LOS=B

#14
PM

PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 [redacted]LIZED
[redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=13-PMSC3   GEOMETRICS=13-PMSC3   SIGNAL=13-PMSC3
LOCATED IN CBD:N

VOLUME & GEOMETRICS

DIR	VOLUMES LT	TH	RT	TOTAL	# OF LANES LT	TH	RT	LANE WIDTH LT	TH	RT	CROSS WALK
EB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
WB	144	53	0	197	0	2	0	0.0	12.0	0.0	36
NB	0	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	0	1243	189	1432	0	2	1	0.0	12.0	12.0	36

TOTAL VOLUME = 1629

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK Y/N	MOVES	BUSES	PHF	PEDESTRIANS CROSS	BUT	MIN TIME	ARR TYPE
EB	0.0%	0.0%		0	0	.000	0	Y	12.0	0
WB	0.0%	0.0%	N	0	0	.900	50	Y	12.0	3
NB	0.0%	0.0%	N	0	0	.000	0	Y	12.0	0
SB	0.0%	0.0%	N	0	0	.900	50	Y	12.0	3

PHASINGS

	EASTBOUND l	t	r	p	WESTBOUND l	t	r	p	NORTHBOUND l	t	r	p	SOUTHBOUND l	t	r	p	GREEN	Y+R	PRE/ACT
1								*						*	*		40.0	4	A
2					*	*										*	12.0	4	A

CYCLE= 60.0 LOST= 8.0 SUM V/S CRIT= 0.47 TOTAL V/C= 0.55

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	[redacted]	d2	PF	Delay	LOS	[redacted]	Q
WB	LT-TH	0.32	*	0.20	60.0	15.60	709	0.00	0.85	13.26	B	[redacted]	
SB	TH	0.61	*	0.67	60.0	4.29	2365	0.34	0.85	3.93	A	7.7	24
SB	RT	0.21		0.67	60.0	2.94	1005	0.00	0.85	2.50	A	1.2	4

DIR	Delay	LOS
WB	13.26	B
SB	3.75	A

INTERSECTION DELAY = 4.91 INTERSECTION LOS=A

#16
PM

TAMS Consultants Inc. USING CINCH (VER 2.0) BY SASAKI ASSOCIATES, INC. 11-19-1989
17:04:58
PROJECT NAME: Harborpark IPOD PROJECT NUMBER: 5136-02 BY: AP

1985 HCM - CHAPTER 9: SIGNALIZED

14 [redacted]

LAST DATA SET NAMES LOADED OR SAVED
VOLUME=14-PMSC3 GEOMETRICS=14-PMSC3 SIGNAL=14-PMSC3
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	TOTAL	LT	TH	RT	LT	TH	RT	WALK
EB	338	737	0	1075	1	2	0	12.0	12.0	0.0	36
WB	0	0	601	601	0	0	3	0.0	0.0	12.0	60
NB	0	831	166	997	0	4	0	0.0	12.0	0.0	48
SB	0	0	0	0	0	0	0	0.0	0.0	0.0	0

TOTAL VOLUME = 2673

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3
WB	0.0%	3.0%	N	0	0	.900	50	Y	22.0	3
NB	0.0%	3.0%	N	0	0	.900	50	Y	15.0	3
SB	0.0%	0.0%	N	5	0	.000	50	Y	15.0	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*						*	*						14.0	4	A
2							*					*					14.7	4	A
3	*	*															19.3	4	A

CYCLE= 60.0 LOST=12.0 SUM V/S CRIT= 0.60 TOTAL [redacted]

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	CM	g/C	C	d1	c	d2	PF	Delay	LOS	[redacted]	
EB	LT	0.69		0.32	60.0	13.50	542	3.11	1.00	16.61	C	4.4	14
EB	TH	0.75	*	0.32	60.0	13.84	1141	2.42	0.85	13.83	B	9.3	29
WB	RT	0.75	*	0.24	60.0	15.96	975	2.82	0.85	15.96	C	8.4	26
NB	TH-RT	0.75	*	0.23	60.0	16.25	1617	1.72	0.85	15.27	C	14.1	43

DIR	Delay	LOS
EB	14.67	B
WB	15.96	C
NB	15.27	C

INTERSECTION DELAY = 15.20 INTERSECTION LOS=C